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RESEARCH NOTES

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Western Australian
Department of Agriculture

Number 1 May 1978

INSTRUCTIONS TO AUTHORS

1. Papers dealing with the flora and vegetation of Western Australia will be considered for publication.

2. Style should follow that of a recent issue. Note that all illustrations, including drawings, maps, graphs, and photographs, should follow a single, numbered sequence in each paper. References should quote titles of periodicals in full. Authors should suggest a short title for page headings.

3. Papers will be reviewed by an editorial committee. Contributions should be addressed to the Editor, Research Notes, Western Australian Herbarium, Department of Agriculture, George Street, South Perth, Western Australia, 6151.

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FOREWORD

The aim of this new journal is to bring together information on the flora and vegetation of Western Australia, particularly that of local importance, which has, in the past, tended to disappear into private and official files or be dispersed when herbarium specimens are filed in systematic order.

It is hoped that *Research Notes* will be able to publish a variety of material such as botanical survey reports, check lists, locality records, species distributions and other contributions to the knowledge of our flora which are likely to be of wide interest but have lacked a suitable publication medium.

Interim reports of work in progress will also be considered for publication.

An editorial committee will assess submitted papers in terms of their scope and standard of presentation.

J.W. Green
Curator
Western Australian Herbarium
5 May, 1978

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

No. 1: 1-15

NOTES ON THE VEGETATION AND FLORA OF THE CAPE LONDONDERRY PENINSULA, NORTH KIMBERLEY, WESTERN AUSTRALIA

by A.S. GEORGE

ABSTRACT

An account is given of the eight plant formations and floristics at three sites on the Cape Londonderry peninsula. The formations are woodland, low closed-forest, low open-forest, low woodland, low open-woodland, tall open-shrubland, low scrub and hummock grassland. Mangroves are extensive. Eighty eight plant species are listed, including the mangrove *Scyphiphora hydrophyllacea,* a new generic record for the State. The geology, landforms and climate are briefly discussed.

Issued by the
WESTERN AUSTRALIAN HERBARIUM
SOUTH PERTH, W.A. 6151
MAY, 1978

NOTES ON THE VEGETATION AND FLORA OF THE CAPE LONDONDERRY PENINSULA, NORTH KIMBERLEY, WESTERN AUSTRALIA

by A.S. GEORGE

(Western Australian Herbarium,
South Perth, W.A. 6151)

INTRODUCTION

On Tuesday, 5 August 1975, in the company of Andrew Burbidge of the Wildlife Research Centre, Wanneroo, I visited the Cape Londonderry area in the north Kimberley of Western Australia. No previous botanical collections had been made there.

Cape Londonderry, the northern extremity of the Western Australian mainland, lies at the apex of a broad peninsula in lat. 13°44'S, long. 126°58'E (Fig. 1). It was named in 1819 by Philip Parker King, probably after Londonderry in Ireland (King 1827). To the west-south-west is Cape Talbot, also named by King, after the then Lord Lieutenant of Ireland, while on the north side of the Drysdale River estuary is Curran Point. They are the only named points of the peninsula. The peninsula is uninhabited and has never been used for pastoral purposes.

In contrast to early maritime expeditions along this coast, we travelled by helicopter. The visit was part of a biological expedition to the Drysdale River National Park. The flight from the Park took us to the east coast of the peninsula in about lat. 13°55'S, thence to Cape Londonderry, westwards towards Cape Talbot, inland over the plateau, south-west to the estuary of the Drysdale River and back up the River to the Park. Three landings were made - on the east coast in lat. 13°53'S, long. 127°04'E (site 1); on the north coast in lat. 13°48'S, long. 126°46'E (site 2); and on the plateau in lat. 13°52'S, long. 126°57'E (site 3). At each of the first two sites about 45 minutes were available to record data and collect specimens, while at the third only 30 minutes were allowed. Because of the short time, much recording was done photographically, and plant collections were placed in plastic bags, to be written up and pressed in the afternoon after returning to camp. In all, 104 plant collections were made and several readily-determined species were recorded (e.g. *Bossiaea bossiaeoides*, *Grevillea pteridifolia*), resulting in a preliminary flora list of 88 species for the area. A further 10 species have yet to be determined.

It being late in the dry season, few trees and shrubs were in flower or fruit and the grasses were dead or dormant according to habit. However in the damp area behind the mangroves at site 2 many herbs made a colourful display.

GEOLOGY AND LANDFORMS

The peninsula consists basically of three physiographic divisions - the Prince Regent Plateau in the west; the Gibb Hills in the north and centre; and the Karunjie Plateau in the south-east (Gellatly and Sofoulis, 1969). Drainage is to the sea except in the south-west where it is to the Drysdale River estuary. Streams are mostly of intermittent flow and are relatively small.

The Prince Regent Plateau consists largely of King Leopold Sandstone, but a large proportion of it on the peninsula is overlain by Quaternary sand and colluvium. Further, there is an extensive covering of Tertiary laterite in the north-west and central area, forming a plateau of fairly even surface. Small areas of Quaternary alluvium, beach sand, silt, and mud have accumulated around the coast, with extensive deposits in the estuary of the Drysdale River.

The Gibb Hill geological province is mostly Carson Volcanics, overlain by laterite in areas near the north-east coast. Around the margins there are large pockets of Cainozoic volcanic-derived beach sand and silt. At Cape Londonderry itself is a small deposit of Quaternary shelly limestone.

The Karunjie Plateau is Warton Sandstone with small areas of sand and colluvium. A narrow band of Carson Volcanics lies along part of the east coast with pockets of beach sand and silt in bays.

Most of the peninsula is plateau-like with an elevation of about 70 metres. Some dissection by streams has occurred. In sandstone areas the surface is rugged but lateritic surfaces are relatively smooth.

The coast has a ria shoreline, irregular, and often colourful and spectacular (Fig. 2). In places the sandstone and lateritic plateau reaches the coast where it ends abruptly as cliffs or steep screes (Figs. 2, 8). Intermittent streams enter many bays. In one case, two fall into a narrow inlet over vertical sandstone cliffs: probably a spectacular sight in the wet season. At other places the plateau descends more gradually to the sea (Figs. 3,4,5). Alluvial deposits of sand or silt have built up in some bays and estuaries (Figs. 6,7).

CLIMATE

No weather-recording stations occur on the peninsula, the nearest being Kalumburu Mission to the south-west in about lat. 14°17'S, long. 126°43'E. Here the rainfall is about 1600 mm, most of which falls between November and March. During the remaining months little rain falls and relative humidity is low. The mean monthly maxima are about 32°C in the coolest months (June-August) and 37°C in the warmest (October-November). Mean monthly minima range from 14°C to 25°C. (Data provided by the Bureau of Meteorology). The temperature probably never falls to 0°C, though frosts have been recorded in the central Kimberley.

VEGETATION AND FLORA

The variety of landform and geological substrate was reflected in the vegetation. On the coast, alluvial flats and some rocky shores supported mangroves in a low closed-forest or closed-scrub (Figs. 3,4,7,8,10). (Structural terminology is that of Specht *et al.* 1974). Some stands were zoned, others very mixed. They were sampled at sites 1 and 2. Mangroves recorded were *Avicennia marina, Bruguiera exaristata, Lumnitzera racemosa* and *Scyphiphora hydrophyllacea.* This is the first record in Western Australia of the genus *Scyphiphora* (Rubiaceae). On the landward margin of the mangroves the fern *Acrostichum speciosum* sometimes occurred.

Extensive stands of mangroves occurred on silt around the estuary of the Drysdale River (Fig. 7).

Sandy coastal flats carried open hummock grassland, sometimes with scattered shrubs and *Pandanus* (Figs. 6,8). At site 1, a spinifex *(? Triodia)* was dominant, while the shrubs were *Grevillea refracta, G. viscidula* and a few *Phyllanthus baccatus.*

At the edge of the Plateau, sandstone screes supported the low closed-forest formation known as vine thicket (Figs. 8,9). At site 1 it was sampled where the scree rises at the back of a sandy flat, but along the inlet nearby it occurred as a narrow belt immediately above the mangroves. The formation was rich in genera especially of Indo-Malaysian elements; typical Australian genera such as *Eucalyptus, Acacia* and *Triodia* were absent. The following species were recorded:

Trees and shrubs

Bridelia ? tomentosa, Buchanania obovata, Cassine melanocarpa, Celtis philippensis, Cryptocarya sp., *Glycosmis pentaphylla, Gyrocarpus americanus, Pithecellobium moniliferum, Planchonia australis, Pouteria sericea* , *Stenocarpus cunninghamii, Strychnos lucida, Terminalia petiolaris,* and several undetermined species.

Creepers

Capparis sp., *Flagellaria indica, Malaisia scandens, Passiflora foetida,* and two undetermined taxa.

Tall open-shrubland occupied the edge of the sandstone plateau at site 1 where the surface was rocky and rugged. There were no dominants. Part of the area had been burnt, probably about two years previously. The shrubs and small trees recorded were: *Acacia ? gonocarpa, A. ? retinervis, Brachychiton* sp., *Eucalyptus* sp. (a bloodwood), *Ficus platypoda, Grevillea cunninghamii, Owenia vernicosa, Planchonella arnhemica, Sarcostemma australe* and *Xanthostemon* sp. A spinifex (? *Plectrachne*) was common. In the burnt area were short-lived shrubs and perennial herbs, probably fire-opportunists, including *Cassia oligoclada, Denisonia ternifolia, Scaevola ovalifolia, Trachymene hemicarpa* and *Triumfetta* aff. *appendiculata.*

The vegetation of the plateau, whether on laterite or sandstone, was mostly woodland, low open-forest, low woodland and low open-woodland (Figs. 3,4,5,10,11). It was dominated by species of *Eucalyptus* with a sparse understorey of shrubs and a ground cover of grasses. In some rugged areas of King Leopold Sandstone to the east of the estuary of the Drysdale River, fan palms (*Livistona*) were common (Fig. 13). They were probably *L. loriphylla* which was common on similar sandstone hills near the river farther south (George & Kenneally 1977).

The woodland of the lateritic plateau was sampled at site 3 (Fig. 11). The surface here was quite level with a typical gravelly soil. The dominant trees were *Eucalyptus bleeseri, E. latifolia* and *E. tetrodonta.* Other trees and shrubs were *Buchanania obovata, Calytrix microphylla, Grevillea agrifolia, Melaleuca viridiflora, Terminalia canescens* and

Verticordia cunninghamii. A rather sparse ground cover of grasses was very dry; the only herbs in flower or fruit were *Blumea* sp., *Borreria ? australiana* and *Buchnera urticifolia*.

At site 2, a low woodland occurred on sandy soil behind the mangroves (Fig. 10). It was dominated by bloodwood species of *Eucalyptus*. An open understorey of shrubs included *Acacia translucens, Bossiaea bossiaeoides, Burtonia subulata, Persoonia falcata, Syzygium suborbiculare* and *Verticordia cunninghamii*. Herbs among the dry grass were *Blumea* sp., *Bonamia ? pannosa, Buchnera urticifolia, Pimelea sanguinea, Scaevola ovalifolia* and the fern *Platyzoma microphyllum*.

Two small swampy areas were sampled. One at the foot of the vine thicket at site 1, was dominated by *Melaleuca viridiflora*. The other, at site 2, lay behind the mangroves and again was dominated by *Melaleuca viridiflora* with admixture of *Pandanus darwinensis* and *Myoporum acuminatum*. Farther back, probably beyond the reach of Spring tides, were *Acacia plectocarpa, A. pellita, Grevillea pteridifolia, Pandanus spiralis, Thespesia populneoides, Phylidrum lanuginosum* and tall grasses. At the same site, a narrow damp area between the mangroves and the low woodland supported a colourful array of herbs in open swards between shrubs. Those recorded were *Byblis liniflora, Centrolepis exserta, Drosera indica* (with pink flowers), *Fuirena ciliaris, Hemiarrhena plantaginea, Mimulus* sp. (with yellow flowers), *Stylidium multiscapum, Thysanotus chinensis, Utricularia chrysantha,* and *Xyris* aff. *complanata*.

At the same locality two herbs grew on open sandstone rocks by the mangroves - *Eleocharis* sp. and *Pluchea rubelliflora*.

A list of the determined flora is given in Table 1. It contains 88 species - 2 ferns in 2 families, 10 monocots in 9 genera of 7 families, and 76 dicots in 63 genera of 43 families.

DISCUSSION

The geology and vegetation of the area is described by N.H. Speck (in Speck *et al*. 1960). Because the available data were limited his treatment is necessarily broad, and the present work has the advantage of the more detailed geological studies of Gellatly and Sofoulis (1969) as well as the opportunity to visit the area.

Site 1 is remarkable for the variety of vegetation formations within a small area. A sketch map (Fig. 12) taken from aerial photography shows the sudden changes in vegetation between shore and plateau due to soil and moisture changes. Although site 2 is less varied, a map is also provided (Fig. 14) to show the vegetation pattern. Site 3 is relatively uniform.

Several of the species collected are of special interest. The record of *Scyphiphora* brings the number of mangrove species in Western Australia to 15. A new variety of *Pandanus* has been described based on a collection from site 2 - *P. spiralis* var. *multimammillatus* B.C. Stone. It is the only collection made so far of the variety. The *Mimulus* from site 2 (also collected in the Drysdale River National Park) is apparently undescribed and is the first indigenous species with yellow flowers found in the State. The record of *Malaisia scandens* extends the range in the State of this recently recorded species - other localities are Augustus Is., SW Osborne Is., Mt. Trafalgar and Gandjal Ck (the last two being in the Prince Regent River Nature Reserve).

Terminalia petiolaris is also an interesting record since the species was previously known only from the Dampier Peninsula in the south western Kimberley.

The observation of *Livistona* (not collected but tentatively named *L. loriphylla* since it appeared from the air to be the same as that species collected in the Drysdale River National Park) adds to the distributional data for a genus of restricted occurrence in the State.

The peninsula is varied in landform, geology and vegetation, the scenery in places spectacular, always colourful. In general the vegetation and flora are similar to parts of the Drysdale River National Park (George & Kenneally, 1977), but a feature is the extensive lateritic plateau, a formation which is rare elsewhere in the north Kimberley (the Mitchell Plateau to the south-west carries a completely different vegetation).

The area would be well worth surveying in and just after the wet season.

ACKNOWLEDGEMENTS

The visit was part of a biological survey of the Drysdale River National Park which was supported in part by a grant to the Department of Fisheries and Wildlife from the Australian Biological Resources Study. I thank Andrew Burbidge for his assistance in the field and Joe Ward for his accomplished and cheerful flying. Assistance in determining plants was received from the staff of the Western Australian Herbarium, Mrs. S.G.M. Carr (Research School of Biological Sciences, Australian National University) and Dr. B.C. Stone (University of Malaya, Kuala Lumpur). The Photogrammetry Section of the Department of Lands and Surveys provided aerial photographs for study.

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TABLE 1

LIST OF SPECIES RECORDED ON CAPE LONDONDERRY PENINSULA. All except those marked (obs.) are represented by collections in the Western Australian Herbarium (PERTH).

Species and Family	Site		
	1	2	3
Acacia ? gonocarpa F. Muell. Mimosaceae	x		
Acacia pellita O. Schwartz Mimosaceae		x	
Acacia plectocarpa Benth. Mimosaceae		x	
Acacia ? retinervis Benth. Mimosaceae	x		
Acacia translucens A. Cunn. ex Hook. Mimosaceae		x	
Acrostichum speciosum Willd. Pteridaceae		x	
Avicennia marina (Forsk.) Vierh. Avicenniaceae	x		
Blumea sp. Asteraceae		x	x
Bonamia ? pannosa (R.Br.) Hall.f. Convolvulaceae		x	
Borreria ? australiana Specht Rubiaceae			x
Bossiaea bossiaeoides (A. Cunn. ex Benth.) A.B. Court Papilionaceae (obs.)		x	
Brachychiton sp. Sterculiaceae	x		
Bridelia tomentosa Bl. Euphorbiaceae	x		
Bruguiera exaristata Ding Hou Rhizophoraceae	x	x	
Buchanania obovata Engl. Anacardiaceae	x		x
Buchnera urticifolia R.Br. Scrophulariaceae		x	x
Burtonia subulata (Benth.) Benth. Papilionaceae		x	
Byblis liniflora Salisb. Byblidaceae		x	
Calytrix microphylla A. Cunn. Myrtaceae			x
Capparis sp. Capparidaceae	x		
Cassia oligoclada F. Muell. Caesalpiniaceae	x		
Cassine melanocarpa (F. Muell.) O. Kuntze Celastraceae	x		
Cassytha filiformis L. Lauraceae	x	x	
Celtis philippensis Blanco Ulmaceae	x		
Centrolepis exserta (R.Br.) R. & S. Centrolepidaceae		x	
Cryptocarya sp. Lauraceae	x		
Cyperus sp. Cyperaceae	x		
Decaisnina signata (F. Muell. ex Benth.) Tiegh. Loranthaceae	x		
Denisonia ternifolia F. Muell. Dicrastylidaceae	x		
Drosera indica L. Droseraceae		x	
Eleocharis sp. Cyperaceae		x	
Eucalyptus bleeseri Blakely Myrtaceae			x
Eucalyptus latifolia F. Muell. Myrtaceae		x	
Eucalyptus tetrodonta F. Muell. Myrtaceae			x
Eucalyptus sp. (bloodwood) Myrtaceae		x	
Exocarpos latifolius R.Br. Santalaceae	x		
Ficus platypoda A. Cunn. Moraceae	x		
Ficus virens Ait. Moraceae	x		
Flagellaria indica L. Flagellariaceae	x		
Fuirena ciliaris (L.) Roxb. Cyperaceae	x	x	

cont.

Table 1 (cont.)

Species and Family	Site		
	1	2	3
Gardenia sp. Rubiaceae	x		
Glycosmis pentaphylla (Retz.) DC. Rutaceae	x		
Grevillea agrifolia A. Cunn. ex R.Br. Proteaceae (obs.)			x
Grevillea cunninghamii R.Br. Proteaceae	x		
Grevillea pteridifolia Knight Proteaceae (obs.)		x	
Grevillea refracta R.Br. Proteaceae	x		
Grevillea viscidula C.A. Gardn. Proteaceae	x		
Gyrocarpus americanus Jacq. Gyrocarpaceae	x		
Hemiarrhena plantaginea Benth. Scrophulariaceae		x	
Livistona ? loriphylla Beccari Arecaceae (obs. from air)			
Lumnitzera racemosa Willd. Combretaceae	x		
Malaisia scandens (Lour.) Planch. Moraceae	x		
Melaleuca viridiflora W.V. Fitzg. Myrtaceae	x	x	x
Mimulus sp. Scrophulariaceae		x	
Mitrasacme sp. Loganiaceae		x	
Myoporum acuminatum R.Br. Myoporaceae		x	
Owenia vernicosa F. Muell. Meliaceae (obs.)	x		
Pandanus darwinensis St. John var. *latifructus* (St. John) B.C. Stone Pandanaceae		x	
Pandanus spiralis R.Br. var. *multimammillatus* B.C. Stone Pandanaceae		x	
Parsonsia velutina R.Br. Apocynaceae	x		
Passiflora foetida L. Passifloraceae (obs.)	x		
Persoonia falcata R.Br. Proteaceae	x	x	
Phylidrum lanuginosum Banks & Solander ex Gaertn. Phylidraceae		x	
Phyllanthus baccatus F. Muell. ex Benth. Euphorbiaceae	x		
Pimelea sanguinea F. Muell. Thymelaeaceae		x	
Pithecellobium moniliferum (Hassk.) Benth. Mimosaceae	x		
Planchonella arnhemica (F. Muell.) C.A. Gardn. Sapotaceae	x		
Planchonia australis (F. Muell.) Kunth. Barringtoniaceae	x		
Platyzoma microphyllum R.Br. Gymnogrammaceae		x	
Pluchea rubelliflora (F. Muell.) Robins Asteraceae		x	
Pouteria sericea (Ait.) Baehri Sapotaceae	x		
Sarcostemma australe R.Br. Asclepiadaceae (obs.)	x		
Scaevola ovalifolia R.Br. Goodeniaceae	x	x	
Scyphiphora hydrophyllacea Gaertn. Rubiaceae		x	
Stenocarpus cunninghamii R.Br. Proteaceae	x		
Strychnos lucida R.Br. Loganiaceae	x		
Stylidium multiscapum O. Schwarz Stylidiaceae		x	
Syzygium suborbiculare (Benth.) Hartley & Perry Myrtaceae		x	
Terminalia canescens (DC.) Radlk. Combretaceae			x
Terminalia petiolaris A. Cunn. ex Benth. Combretaceae	x		
Thespesia populneoides (Roxb.) Kostel Bombacaceae		x	
Thysanotus chinensis Benth. Liliaceae		x	
Trachymene hemicarpa (F. Muell.) Benth. Apiaceae	x		
Triumfetta aff. *appendiculata* F. Muell. Tiliaceae	x		
Utricularia chrysantha R.Br. Lentibulariaceae		x	
Verticordia cunninghamii Schau. Myrtaceae		x	x
Xanthostemon paradoxus F. Muell. Myrtaceae	x		
Xyris aff. *complanata* R.Br. Xyridaceae		x	

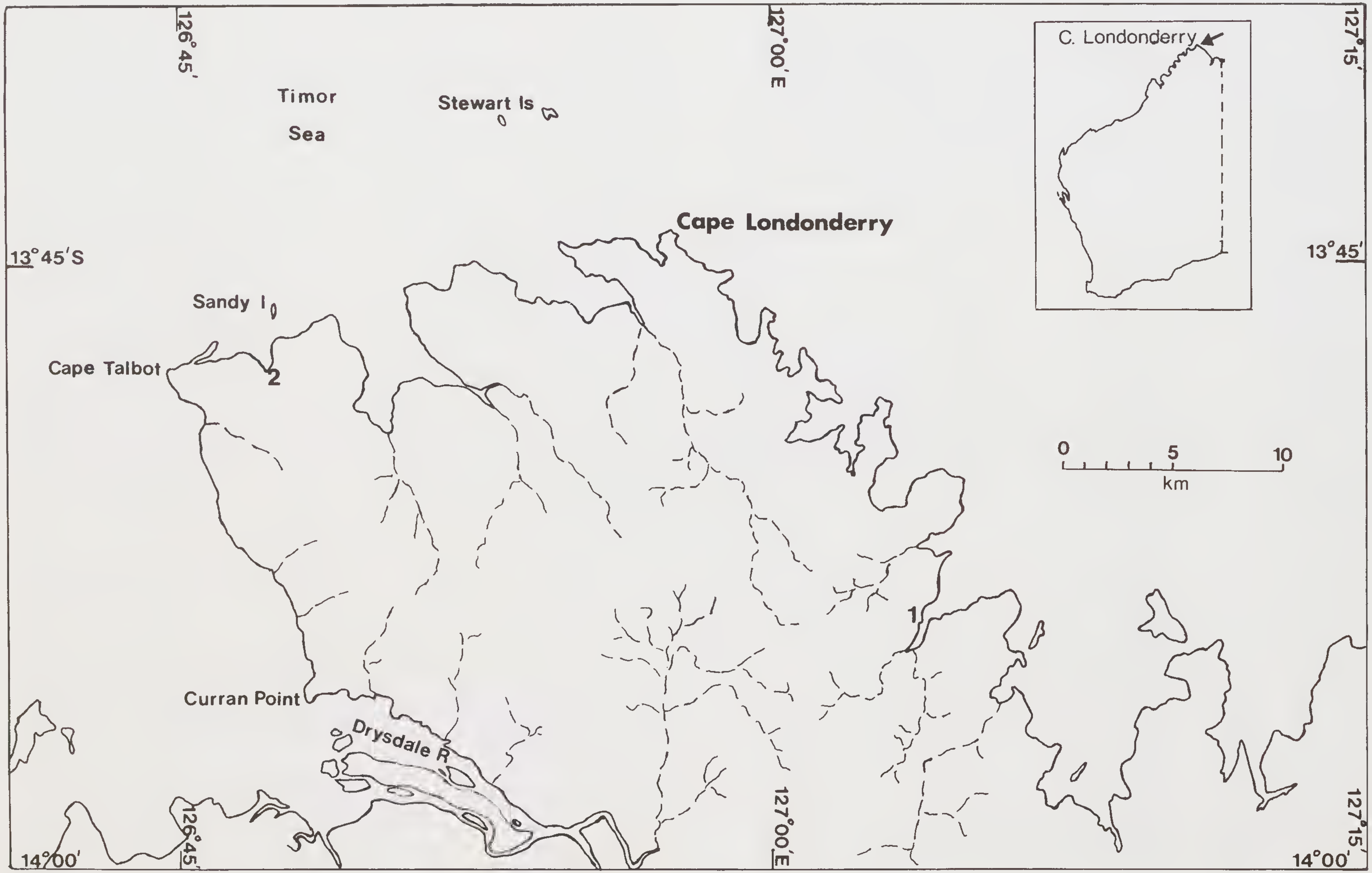

Fig. 1. Map of the Cape Londonderry peninsula. Landing sites are numbered.

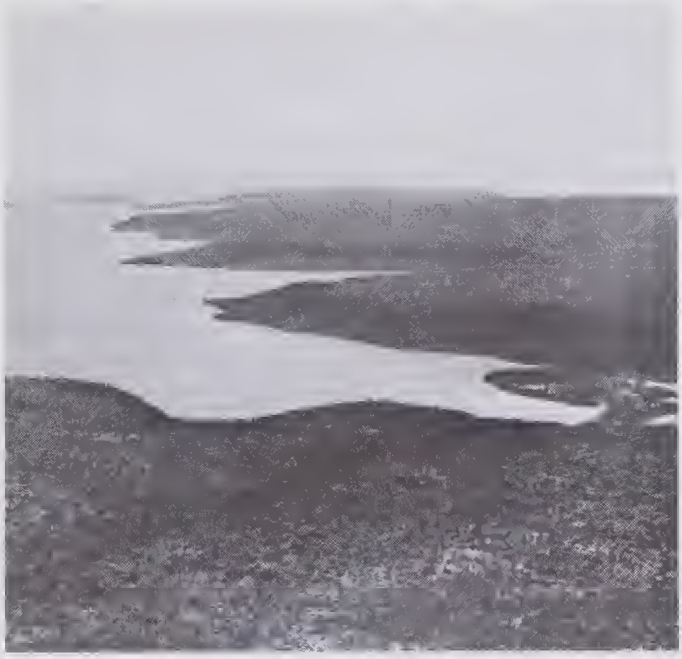

Fig. 2. Coastline on the east side of the large bay in approximately 127°08'E longitude. Sandstone plateau in foreground, mangrove-covered estuary right-centre.

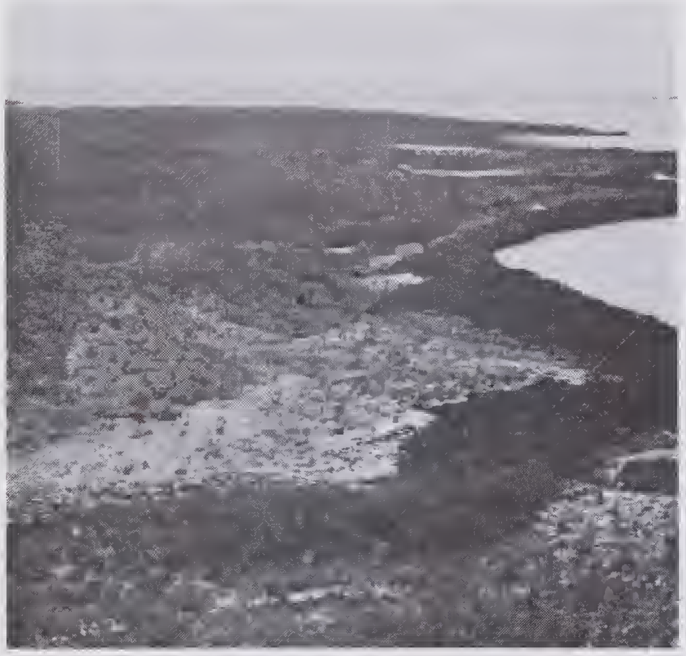

Fig. 3. North coast of the peninsula with mangrove fringe; low sandstone plateau behind with low woodland.

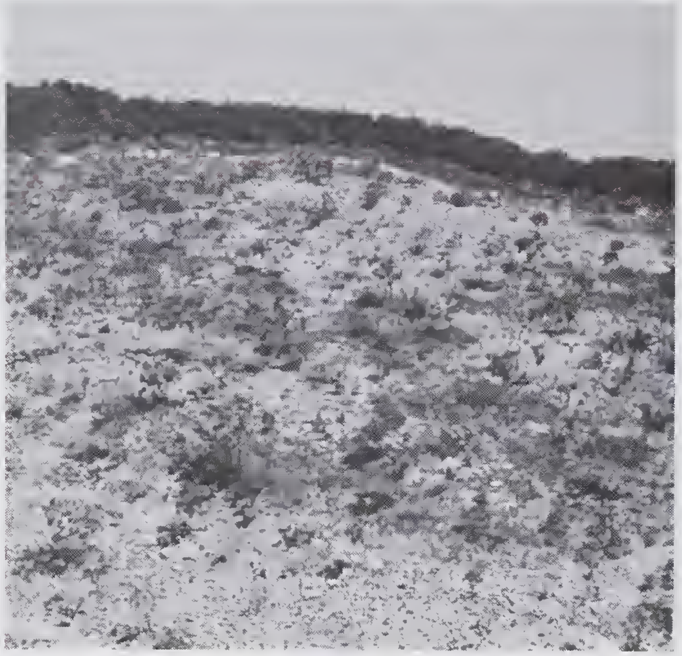

Fig. 4. Narrow mangrove fringe on the north coast of the peninsula, with low open-woodland on sandstone in foreground.

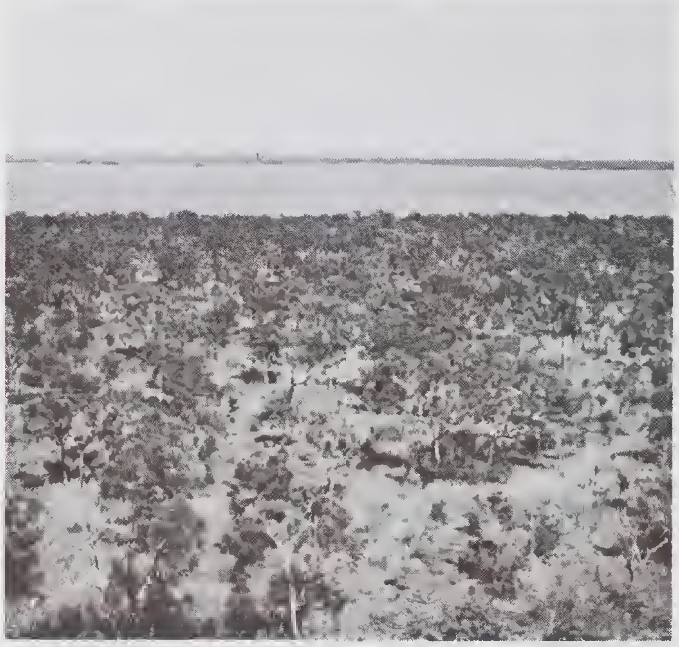

Fig. 5. *Eucalyptus* woodland near the coast west of Cape Londonderry, looking across a large bay.

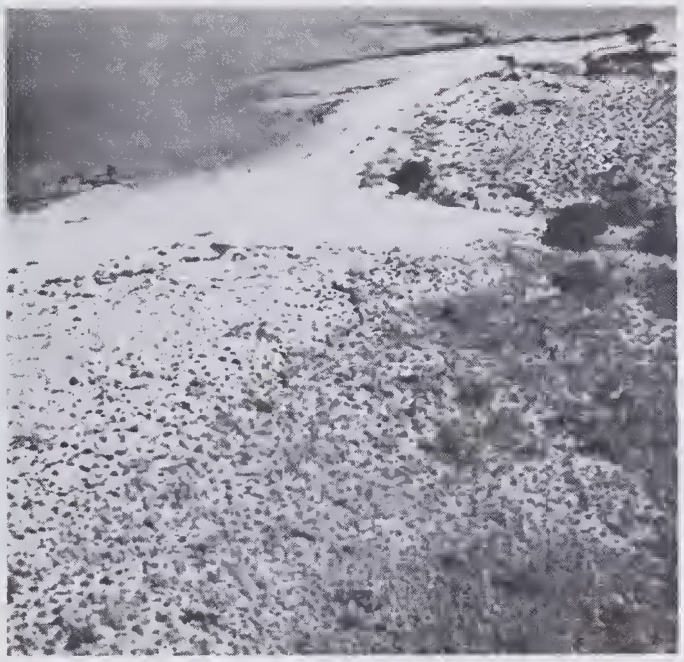

Fig. 6. A sandy shore west of Cape Londonerry with ? *Triodia* and scattered shrubs including a few *Pandanus*.

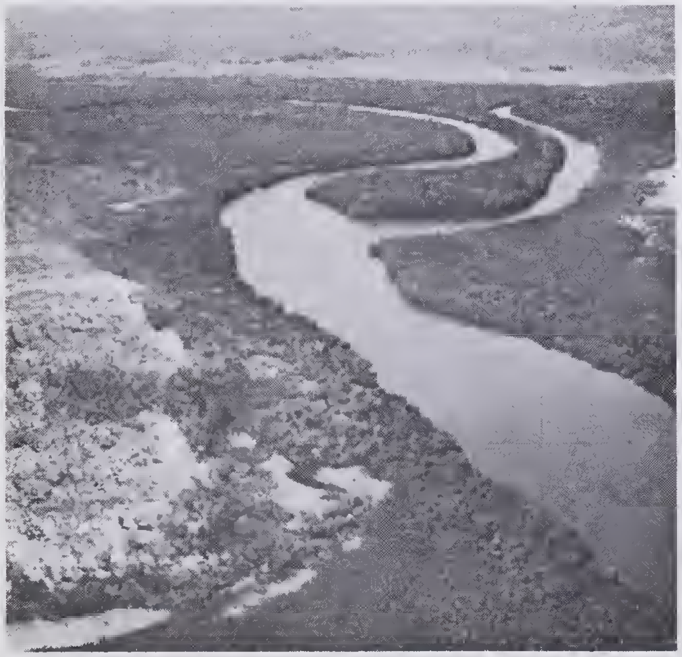

Fig. 7. Mangroves in the tidal estuary of a tributary of the Drysdale River east of its mouth.

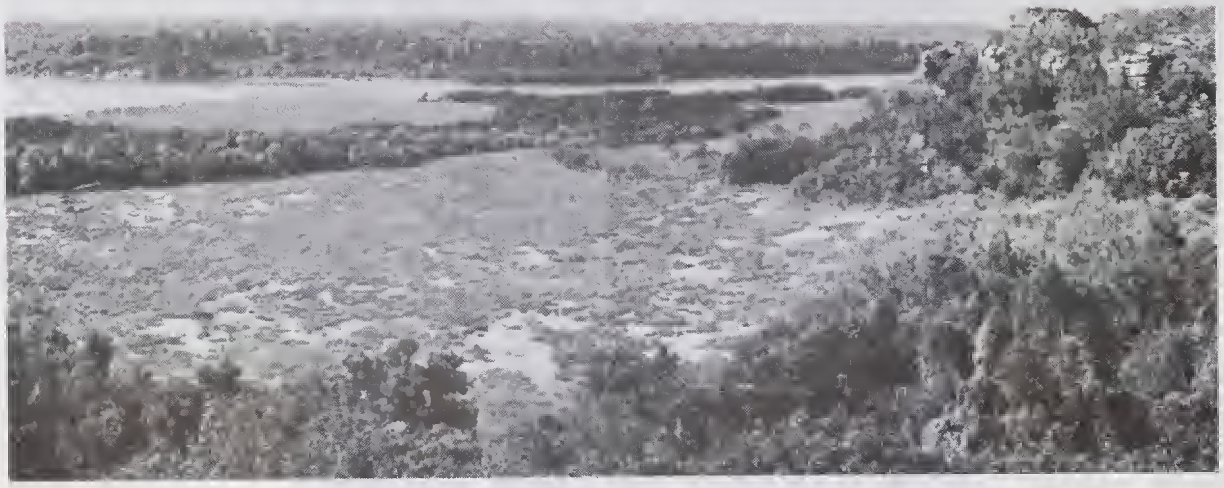

Fig. 8. At site 1; tall open-shrubland on sandstone plateau, vine thicket on scree (including foreground), hummock grassland with scattered *Grevillea* on sandy flat, mangrove creek (centre-left to centre), inlet beyond with sandstone cliffs on farther side. Helicopter (left) gives scale.

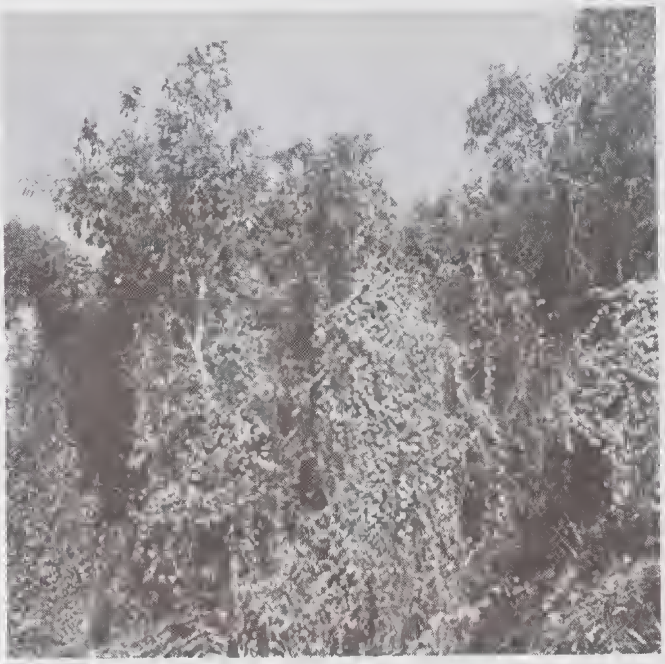

Fig. 9. At site 1; *Melaleuca viridiflora* festooned with *Passiflora foetida*, along small creek at edge of vine thicket.

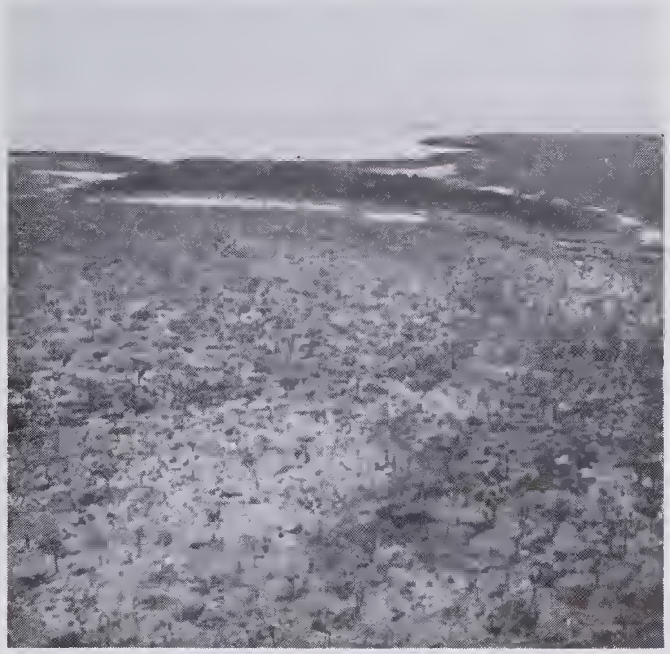

Fig. 10. At site 2, view north; mangrove-filled inlet, with low woodland in foreground; the swampy area is just out of the picture beyond right-centre. Sandy Island offshore, top right.

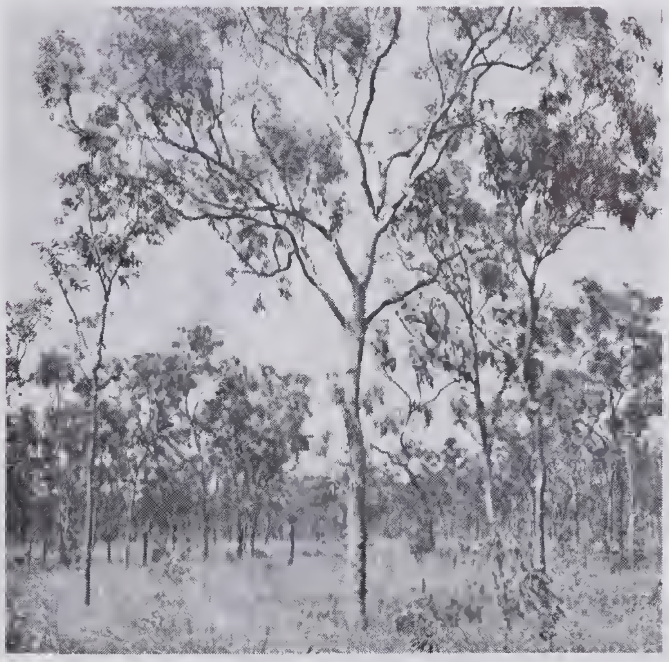

Fig. 11. At site 3; woodland with *Eucalyptus bleeseri*, *E. tetrodonta* and *E. latifolia*; understorey of grasses and scattered shrubs.

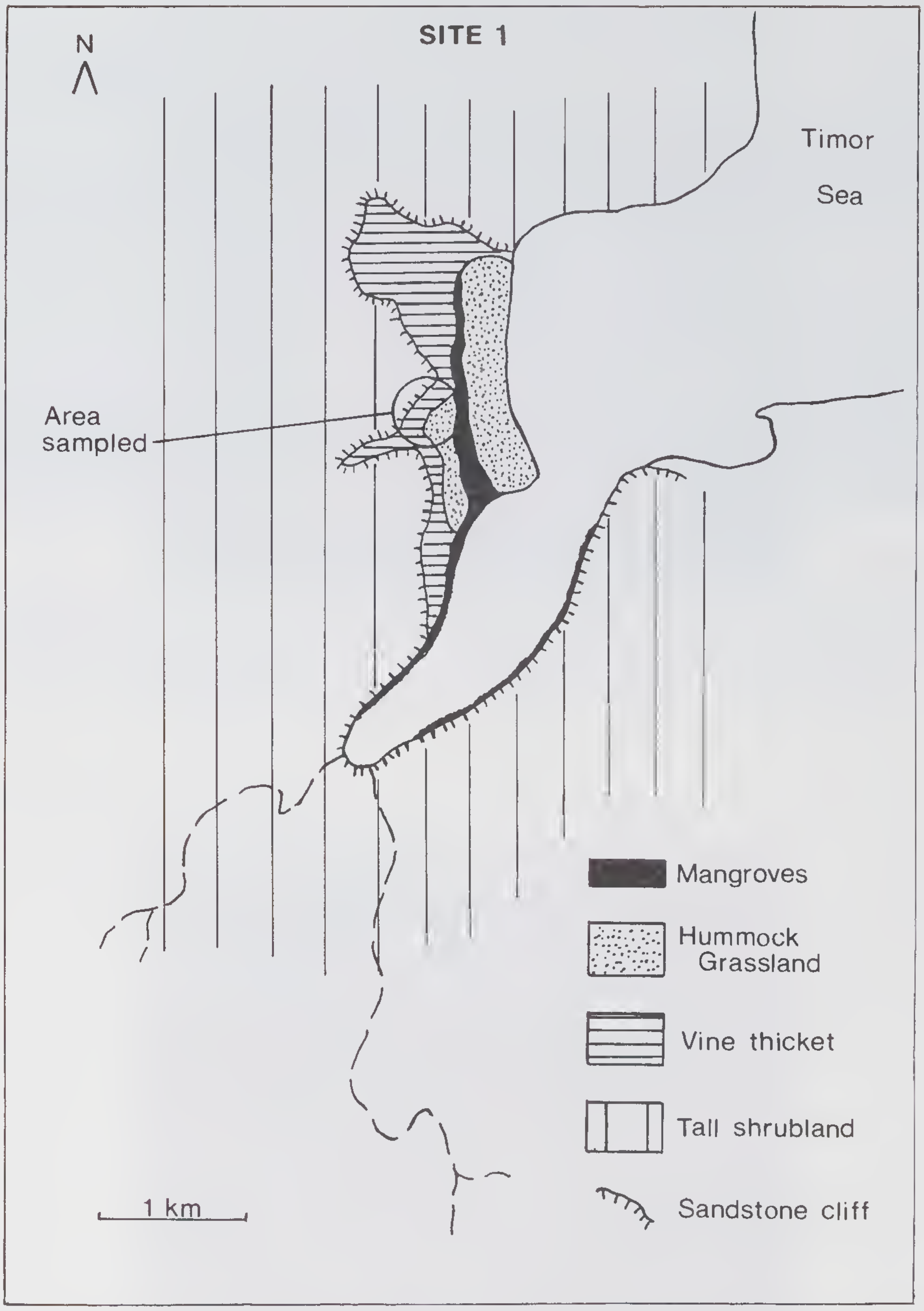

Fig. 12. Sketch map of vegetation types at site 1, taken from 1947 aerial photography.

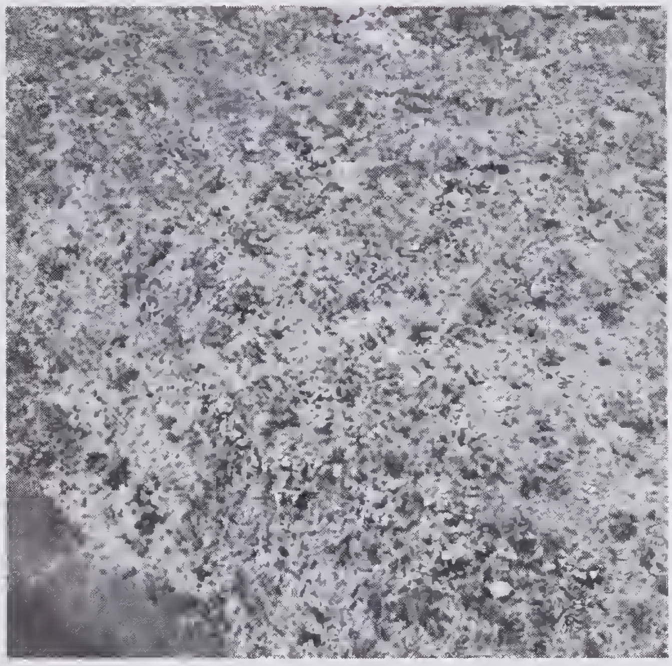

Fig. 13. Edge of the sandstone plateau east of the Drysdale River estuary; low open-woodland with many *Livistona*.

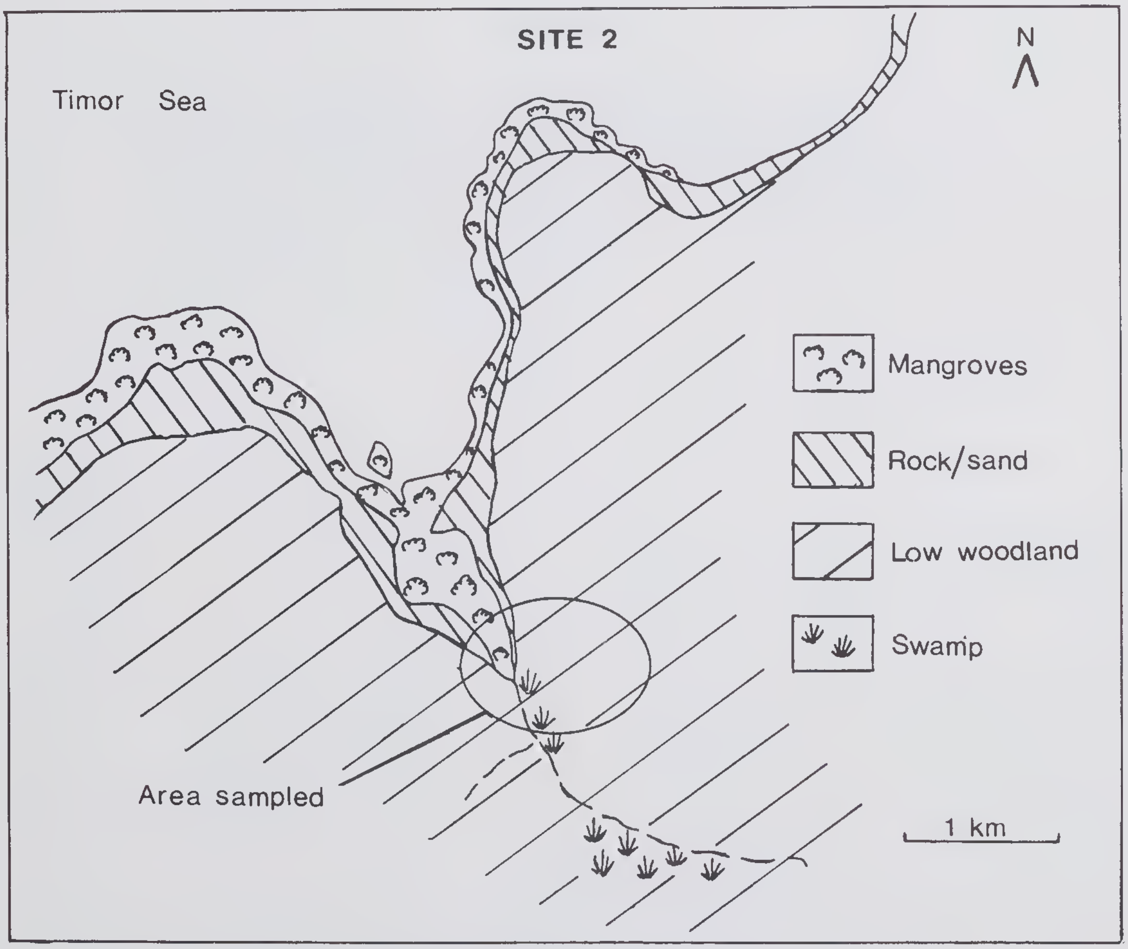

Fig.14. Sketch map of vegetation types at site 2.

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

No. 1: 17-18

RECORDS OF MYXOMYCETES IN WESTERN AUSTRALIA

by R.J. HNATIUK

ABSTRACT

Nine species in seven genera and 4 families are reported for Western Australia. The species are: *Arcyria cinerea*, *A. nutans*, *Comatricha nigra*, *Diachea leucopodia*, *Lycogala epidendrum*, *Physarum nutans*, *Physarum viride*, *Stemionitis fusca*, and *Trichia favoginea*.

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RECORDS OF MYXOMYCETES IN WESTERN AUSTRALIA

by R.J. HNATIUK

(Western Australian Herbarium,
South Perth, W.A. 6151)

Nine species, representing seven genera of myxomycetes are reported for Western Australia. A further two (probably Echinosteliaceae) as yet indeterminate collections have been made. The nine species are representative of those that are either cosmopolitan or widely distributed in their climatic-geographic zones. Before the collections reported below were made during 1976-78, none were present in the Western Australian Herbarium (PERTH), although a few were kept in the mycological collections at the Botany Department, University of Western Australia (UWA).

Nomenclature follows that of Martin and Alexopoulos (1969).

RETICULARIACEAE

Lycogala epidendrum (L.) Fries

Fallen log; Bluff Knoll, Stirling Range, W.A. (Hnatiuk 761450).

TRICHIACEAE

Arcyria cinerea (Bull.) Pers.

Rotting wood in vine thicket; Mitchell Plateau, W.A. (Hnatiuk 761452).

Arcyria nutans (Bull.) Grev.

Underside of *Eucalyptus marginata* bark on ground; Darling Range near Mount Helena (Hnatiuk 780074).

Trichia favoginea (Batsch) Pers.

Rotting bark; Bluff Knoll, Stirling Range, W.A. (Hnatiuk 761447); rotting wood on ground in *Eucalyptus marginata*-*E. diversicolor* forest; ca. 15 km N of Augusta

STEMIONITACEAE

Diachea leucopodia (Bull.) Rost.

Rotting leaves in garden; Perth, W.A. (Hnatiuk 761453).

Comatricha nigra (Pers.) Schroet.

Plank *(Eucalyptus marginata)* in suburban garden; Perth, W.A. (Hnatiuk 761454).

Stemionitis fusca Roth.

Rotting bark on ground, *Eucalyptus marginata*-*E. diversicolor* forest; ca. 15 km N of Augusta (Hnatiuk 771541).

PHYSARACEAE

Physarum nutans Pers.

Rotting wood in vine thicket, Mitchell Plateau, W.A. (Hnatiuk 761451).

Physarum viride (Bull.) Pers.

Rotting bark, Bluff Knoll, Stirling Range, W.A. (Hnatiuk 761449).

ACKNOWLEDGEMENTS

I am grateful to Dr. Nannenga-Bremenkamp (Doorwerth, Netherlands) for confirmation of most of the names reported here.

REFERENCE

Martin, G.W. & Alexopoulos, C.F. (1969) - *The Myxomycetes*. University of Iowa Press, Iowa City.

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

No. 1: 19-27

A VEGETATION AND FLORA RECONNAISSANCE OF AVON LOCATION 19769

by A.S. GEORGE AND R.J. HNATIUK

ABSTRACT

Seven vegetation formations comprising woodland, scrub (mallee), and shrubland are reported for the site about 280 km south east of Perth, Western Australia. One hundred species of vascular plants are listed as occurring there.

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A VEGETATION AND FLORA RECONNAISSANCE OF AVON LOCATION 19769

by A.S. GEORGE AND R.J. HNATIUK

(Western Australian Herbarium,
South Perth, W.A. 6151)

Avon location 19769 ($32^{o}31'$S latitude, $117^{o}56'$E longitude) is situated about 25 kilometres north west of Kulin, a wheatbelt centre about 280 kilometres south east of Perth, Western Australia (Fig. 1). The area of the block of land is about 400 hectares and contains a variety of geomorphic features that range from deep, well-drained, yellow sand, to clayey sand, to lateritic outcrops.

Seven vegetation formations (as defined by Specht, Roe & Boughton, 1974, and modified by the Vegetation Committee of the Australian Biological Resources Survey) have been recognised on the location. These are:

i) woodland dominated by *Eucalyptus wandoo* (Wandoo);
ii) woodland dominated by *Eucalyptus salmonophloia* (Salmon Gum), sometimes with *E. longicornis* (Morrel);
iii) low woodland dominated by *E. astringens* (Brown Mallet);
iv) open scrub with the mallees *E. eremophila, E. redunca* and *E. pileata*;
v) high shrubland of *Casuarina campestris, C. acutivalvis* and *Melaleuca uncinata*;
vi) low open-woodland of *Casuarina campestris, Leptospermum, Melaleuca* species and other shrubs, with scattered trees of *Eucalyptus wandoo*;
vii) shrubland dominated by *Eucalyptus macrocarpa* with a dense, species-rich, shrub understorey.

The most important formation on the Location is the *Eucalyptus macrocarpa* shrubland, for it is one which has become rare in the wheatbelt. Although *E. macrocarpa* itself extends north-westwards to the Hill River region, its associated species vary considerably, and no assemblage such as occurs on Location 19769 is known in a conservation reserve.

The woodlands of the Location are important biologically because they represent formations which through clearing have become scarce in the wheatbelt. The Location may be large enough to support viable populations of some smaller native fauna.

Plant species that are of special interest include outliers from the Eastern Goldfields such as *Daviesia pachylina, Eucalyptus sheathiana,* and *Olearia muelleri*. An undescribed *Baeckea* is known only from this locality, while an undescribed *Isopogon* found here is restricted to this part of the wheatbelt. *Acacia glaucoptera* is a northern outlier of a species of south coastal distribution, while *Acacia pulviniformis* is a rarely found species.

A broad strip across the northern end of the Location has been rolled, probably about 8-10 years ago. It has apparently not been subsequently burned or cultivated, and the regeneration of indigenous flora has been excellent. This includes the main area of _Eucalyptus macrocarpa_. A small gravel pit has been opened on the site.

A tentative list of plant species is presented in Table 1 and represents 100 taxa that were found during two visits in September 1976 and April 1977. A series of photographs illustrating the range of vegetation is given in Figures 2-11.

TABLE 1

FLORA LIST FOR AVON LOCATION 19769

Acacia acuminata Benth.
Acacia glaucoptera Benth.
*_Acacia pulviniformis_ Maiden & Blakely
Acacia restiacea Benth.
Amphipogon turbinatus R.Br.
Baeckea crispiflora F. Muell.
*_Baeckea_ sp.
Banksia sphaerocarpa R.Br.
*_Banksia violacea_ C.A. Gardn.
Beaufortia incana (Benth.) A.S. George
Beaufortia micrantha Schau.
*_Boronia capitata_ Benth.
Borya nitida Labill.
*_Calothamnus_ sp.
Calytrix brachyphylla Turcz.
Cassia nemophila Cunn. ex J.R.T. Vogel
Casuarina acutivalvis F. Muell.
Casuarina campestris Diels
Casuarina humilis Otto & Dietr.
Chamaexeros serra Benth.
Chloanthes coccinea Bartl.
Conospermum bracteosum Meisn.
Conospermum distichum R.Br.
Conospermum ephedroides (Kipp.) Meisn.
Cryptandra sp.
Dampiera sp.
*_Daviesia pachylina_ Turcz.
Dodonaea attenuata A. Cunn.
Dodonaea bursariifolia Behr. & F. Muell.
Dryandra ferruginea Kipp.
Dryandra nivea R.Br.
Dryandra vestita (Kipp.) Meisn.
*_Dryandra_ spp. (3)
Eremophila woollsiana F. Muell.
Eucalyptus albida Maiden & Blakely
Eucalyptus astringens Maiden
Eucalyptus eremophila (Diels) Maiden
Eucalyptus longicornis F. Muell.
Eucalyptus loxophleba Benth.
Eucalyptus macrocarpa F. Muell.
Eucalyptus pileata Blakely
Eucalyptus redunca Schau.
Eucalyptus salmonophloia F. Muell.
Eucalyptus sheathiana Maiden
Eucalyptus transcontinentalis Maiden
Eucalyptus uncinata Turcz.
Eucalyptus wandoo Blakely
Gastrolobium spinosum Benth.
*_Gastrolobium_ sp.
Goodenia watsonii F. Muell. & Tate
*_Grevillea_ aff. _hookerana_ Meisn.
Grevillea huegelii Meisn.
Grevillea ? paniculata Meisn.
Grevillea uncinulata Diels
Hakea baxteri R.Br.
Hakea falcata R.Br.
Hakea gilbertii Kipp.
Hakea lissocarpha R.Br.
Hakea multilineata Meisn.
Hakea prostrata R.Br.
Hakea scoparia Meisn.
Hakea subsulcata Meisn.
Hakea undulata R.Br.
Helichrysum sp.
Hibbertia subvaginata (Steud.) F. Muell.
Isopogon aff. _buxifolius_ R.Br.
Isopogon scabriusculus Meisn.
Isopogon teretifolius R.Br.
*_Isopogon_ sp.
*_Lambertia ilicifolia_ Hook.
Laxmannia sp.
Lepidosperma sp.
Leptospermum sp.
Lomandra effusa (Lindl.) Ewart
Loxocarya sp.
Melaleuca uncinata R.Br.
*_Melaleuca_ spp. (2+)
Olearia muelleri (Sond.) Benth.
Olearia sp.

* represented by voucher specimen in the Western Australian Herbarium (PERTH).

Oxylobium parviflorum Benth.
Persoonia spp. (2)
Petrophile circinata Kipp.
Petrophile ericifolia R.Br.
Petrophile media R.Br.
Petrophile trifida R.Br.
*_Pultenaea_ sp.
Stipa sp.
Templetonia sulcata (Meisn.) Benth.
Thomasia sp.
Thryptomene racemulosa Turcz.
Verticordia chrysantha Endl.
Verticordia grandiflora Endl.
Verticordia insignis Endl.
Verticordia ovalifolia Meisn.
Verticordia serrata (Lindl.) Schau.
Xanthorrhoea nana Herbert

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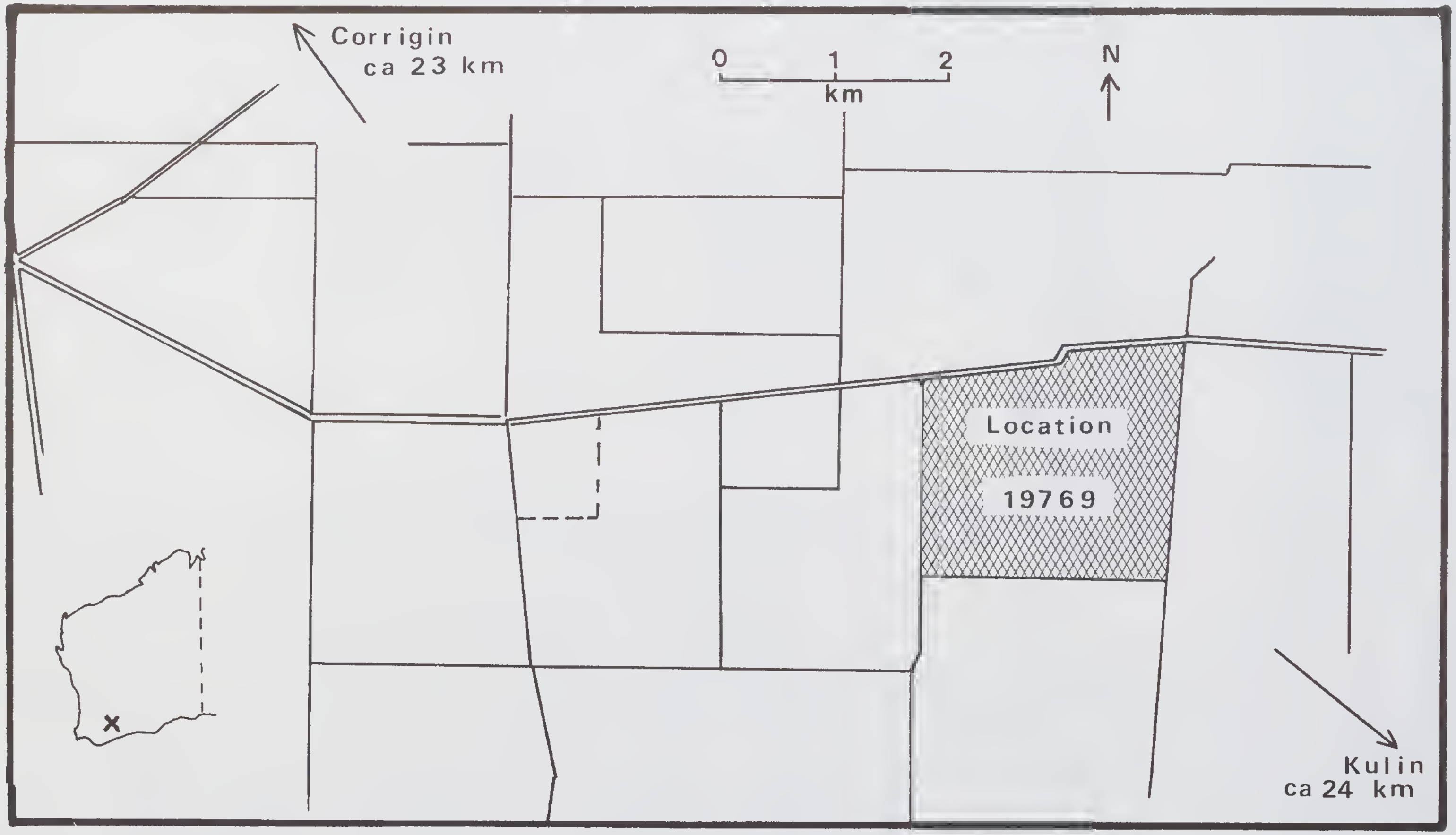

Fig. 1. Map showing Avon Location 19769

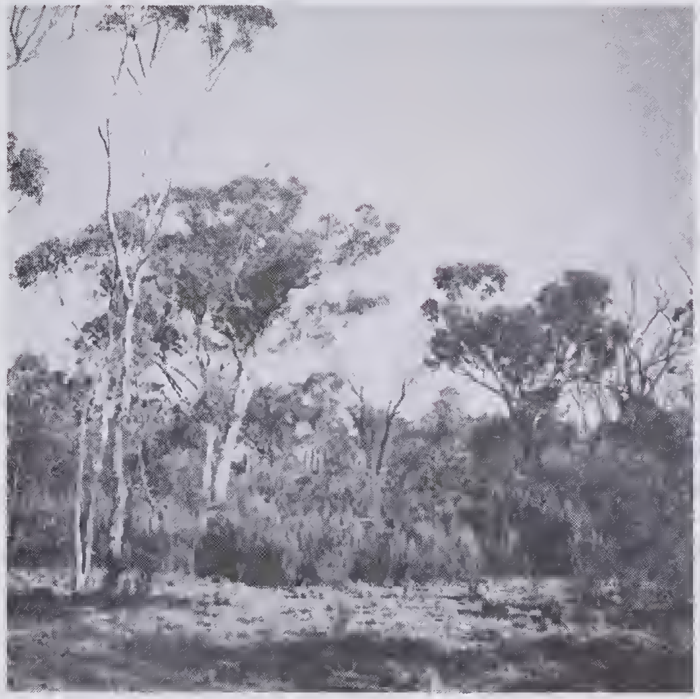

Fig. 2. Woodland with *Eucalyptus wandoo*. Understorey of *Casuarina campestris*. Ground cover - *Borya*, *? Loxocarya*.

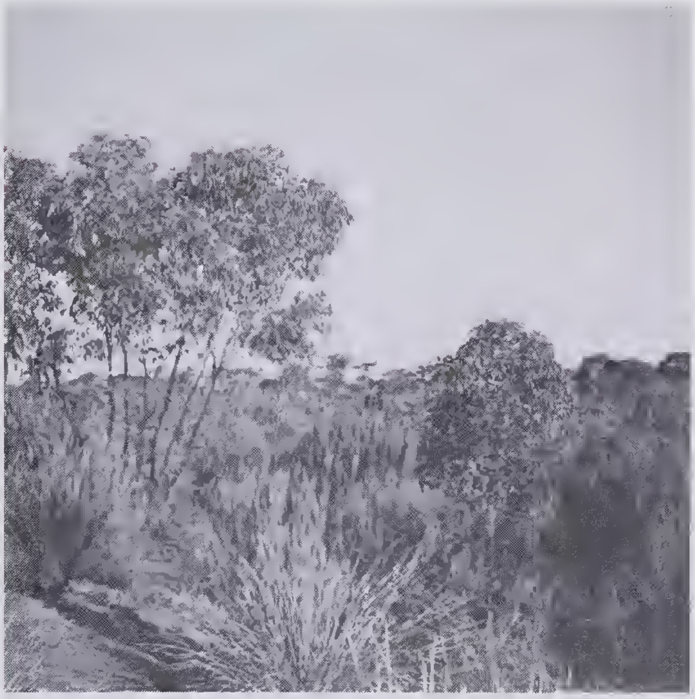

Fig. 3. Regeneration after rolling - *Eucalyptus loxophleba*, *Casuarina campestris*, *Lepidosperma* sp.

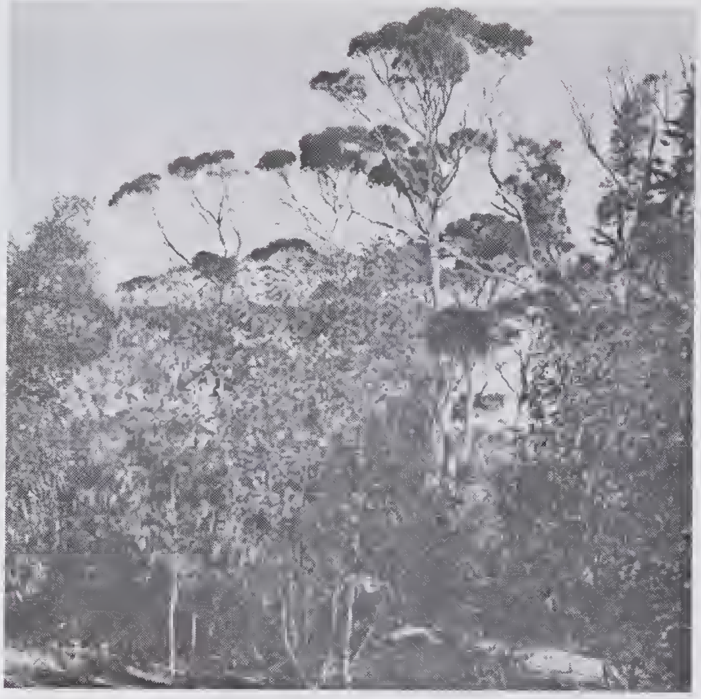

Fig. 4. Foreground - regeneration of *Eucalyptus eremophila* (mallee). Behind - *Eucalyptus salmonophloia*.

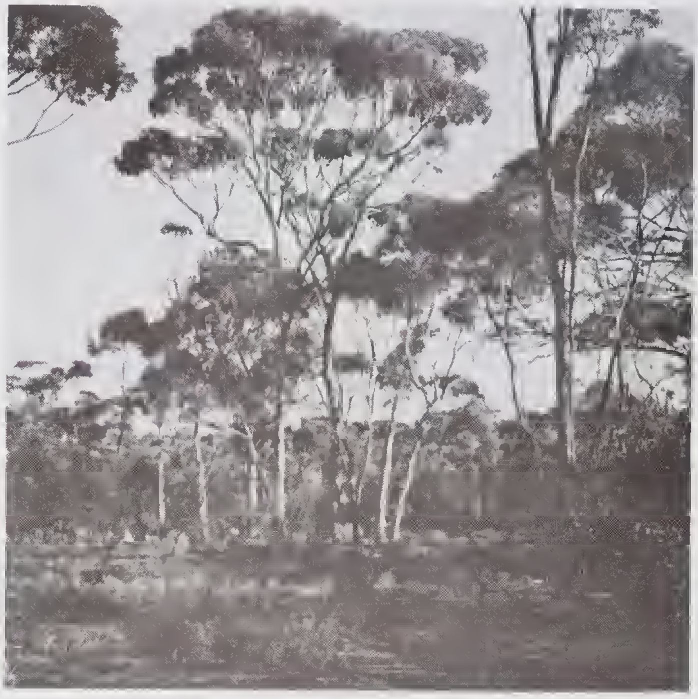

Fig. 5. Woodland - *Eucalyptus salmonophloia* (left), *Eucalyptus longicornis* (right).
Shrubs - *Olearia muelleri*, *Dodonaea*, *Helichrysum*, etc.

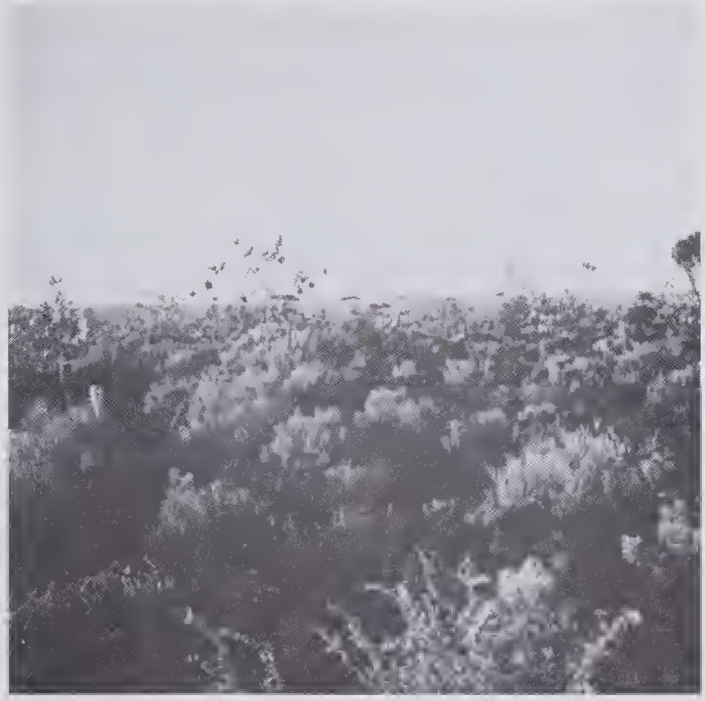

Fig. 6. *Eucalyptus macrocarpa* and heath - *Hakea, Melaleuca, Dryandra, Petrophile, Verticordia,* etc.

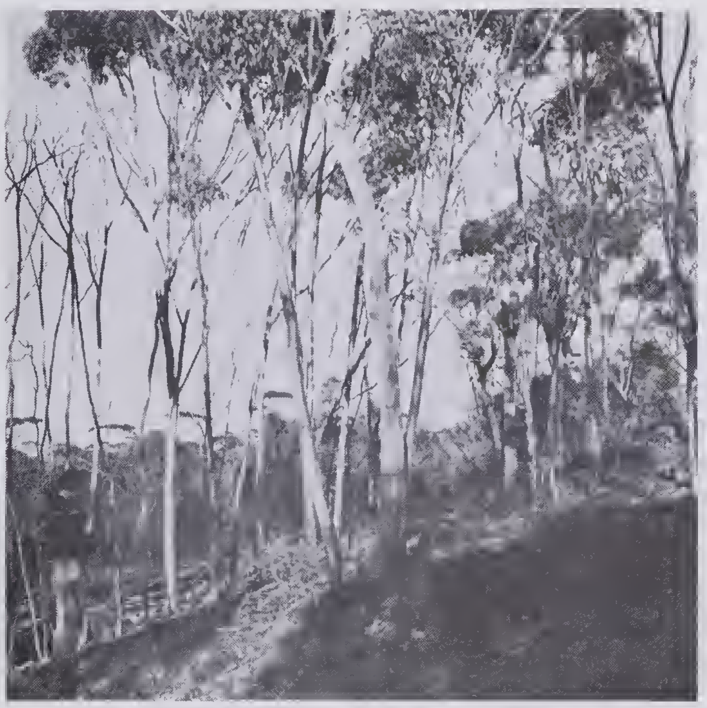

Fig. 7. Low woodland dominated by *Eucalyptus astringens*, little understorey.

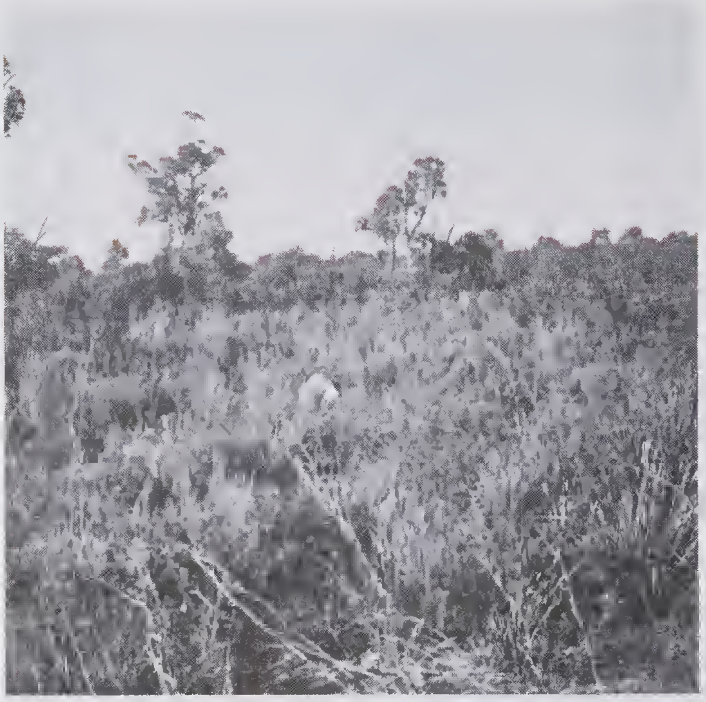

Fig. 8. Regeneration after fire - *Casuarina campestris, Melaleuca* spp., *Lepidosperma, Dryandra*, etc.
Trees - *Eucalyptus wandoo*.

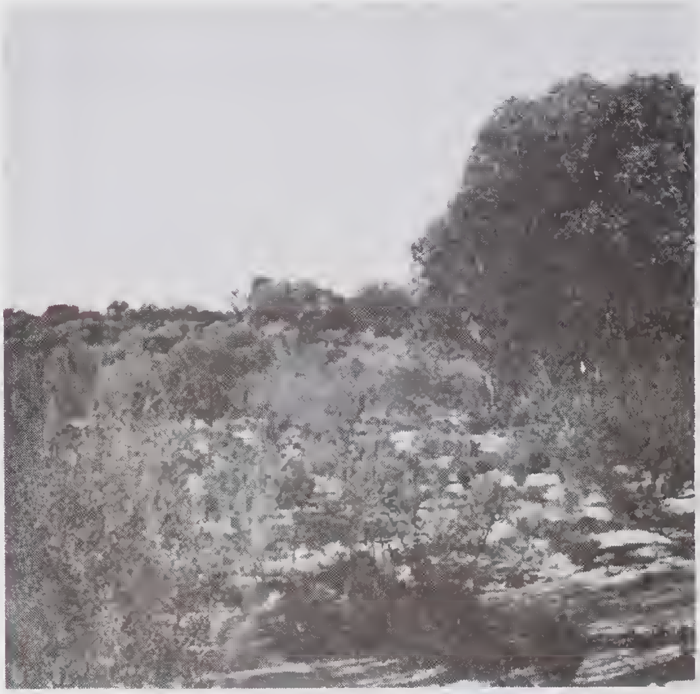

Fig. 9. *Leptospermum ? erubescens* (foreground), *Eucalyptus eremophila* (right), *Casuarina campestris* (left rear).

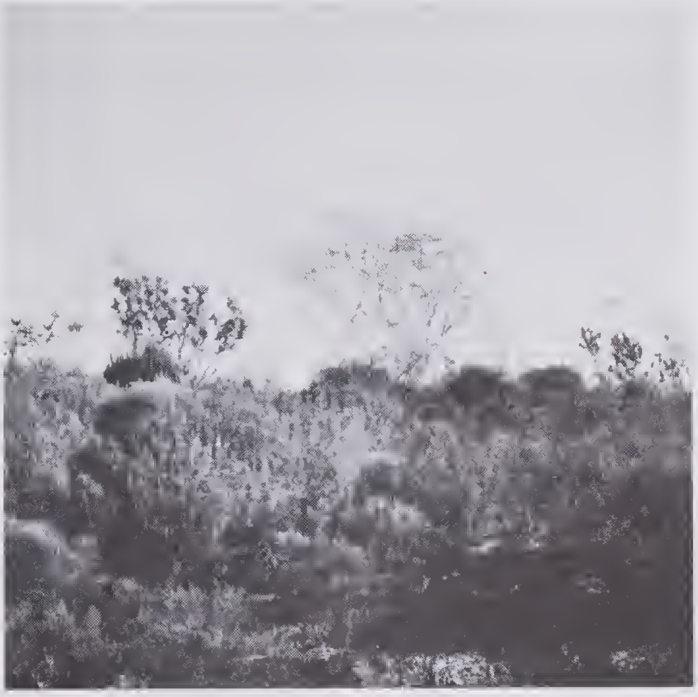

Fig. 10. Edge of *Eucalyptus macrocarpa* - heath, with emergent *Acacia lasiocalyx* and *E. macrocarpa*.

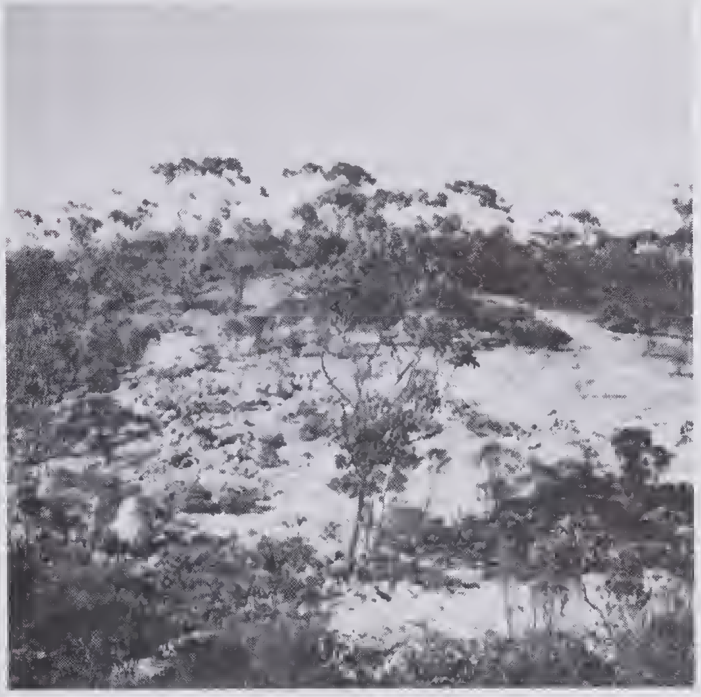

Fig. 11. View of edge of lateritic ridge with tall *Eucalyptus redunca*, *Casuarina campestris*, *C. acutivalvis*, etc. on the ridge. Exposed pallid zone of lateritic soil profile in middle ground.

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES
No. 1: 29-39

NOTES ON THE VEGETATION AND FLORA OF ROCKY POOL, GASCOYNE RIVER

by K.F. KENNEALLY

ABSTRACT

An account is given of the flora and vegetation immediately surrounding Rocky Pool (24°45'S, 114°08'E), a semi-permanent pool located in a constriction of the Gascoyne River.

Plant collections made in 1975 and 1977 have resulted in 59 species of flowering plants being recorded for the area. The Cadjeput (*Melaleuca leucadendron*) and the River Gum (*Eucalyptus camaldulensis*) are the two species best adapted to surviving in the river bed during flood periods. They form a narrow belt of open, riverine forest upstream and downstream from Rocky Pool. The vegetation is otherwise restricted to annual and herbaceous perennial species which can re-invade the alluvial floodplain after floods. Some species appear to be transported onto the floodplain by wildlife watering at Rocky Pool. On the lateritised Toolonga Calcilutite abutting Rocky Pool, shrub species are more common than elsewhere. Five aquatic species are recorded.

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NOTES ON THE VEGETATION AND FLORA OF ROCKY POOL, GASCOYNE RIVER

by K.F. KENNEALLY

(Western Australian Herbarium
South Perth, W.A. 6151)

INTRODUCTION

The Gascoyne River is the second largest river in Western Australia and has a catchment area of 79,000 sq. km. The river flows west through the southern end of the Kennedy Range and across broad flood plains to Rocky Pool (lat. 24°45'S, long. 114°08'E). From here the main channel continues west emptying into the sea near Carnarvon (lat. 24°53'S, long. 113°40'E). (Fig. 1). There are numerous distributary streams forming anabranches which may flow during river floods.

Rocky Pool, 60 km from the mouth of the river, is located at a constriction in the river. It has been formed by the river incising its own flood plain to a depth of between 6 and 9 m, exposing cliffs of sedimentary formations which form the abutments (Figs. 2 and 3). It is a semi-permanent pool which remained full throughout 1967 following cyclonic rain in January and light winter rains (Allen, 1972).

Flows in the Gascoyne River are intermittent. There have been about 90 flows during the period 1906 to 1970 (65 years). During this period the river has failed to flow within a year on twelve occasions. The longest known period without river flow was 3-3/4 years during the period 1911 to 1914. There is no reliable information on the duration of river flows but they are known to range from a few days to about six months (Allen, 1972).

Because of the need for irrigation water at Carnarvon, primarily for banana and vegetable crops on the alluvial flats and adjoining river channel, several sites, including Rocky Pool have been investigated as proposed dam sites (Baxter, 1967 a and b; Allen, 1972).

In October 1975 and June 1977 plant collections were made from an area of 50 m surrounding Rocky Pool and notes made on the vegetation. At both times water was present and being utilised by a wide variety of water birds.

CLIMATE

Carnarvon lies between the winter rainfall area to the south and the summer rainfall area to the north (Gentilli, 1959). It is typified by warm to hot summers modified by strong, reliable sea breezes and by a moderate to warm winter when most of its rainfall is usually received.

The mean annual rainfall at Carnarvon is about 215 mm which is somewhat greater than is received in the rest of the Gascoyne River basin. It comes from cyclones and thunderstorms in summer and from occasional rainbearing depressions in winter. As a consequence, rainfall may vary widely from year to year.

The warmest month is February, and the coolest is July, with mean maxima of 31.2°C and 22.1°C (88.1°F and 71.1°F) and minima of 22.1°C and 10.9°C (71.7°F and 51.6°F) respectively. The average annual evaporation is about 2050 mm which exceeds rainfall tenfold. (Data supplied by Commonwealth Bureau of Meteorology).

GEOLOGY

Rocky Pool lies within the Gascoyne Sub-Basin of the Carnarvon Sedimentary Basin. The Sub-Basin contains sedimentary rocks of Palaeozoic, Mesozoic and Cainozoic age separated by regional unconformities (Condon, 1968).

The geology of the Rocky Pool area has been detailed by Baxter (1967 a & b) and Allen (1972) as part of water supply investigations.

Rocky Pool lies between outcrops of lateritised Toolonga Calcilutite (lime mudstone) of Mesozoic age. The river channel, which averages 600 m in width, is reduced to 75 m between these outcrops (Allen, 1972). The rocks extend underneath the channel forming an impermeable base to the river-bed sand.

Unconsolidated Quaternary sediments overlie the Mesozoic rocks. In the vicinity of Rocky Pool these are red to yellow-brown, medium to coarse, gravelly sands deposited in the river channel. The river bed is composed mainly of coarse sand (Fig. 3) whereas the alluvial plain away from the river consists of indurated, red-brown muds deposited by flooding, with some small sandy channels. Silt-covered islands are frequent immediately upstream of Rocky Pool and towards the mouth of the river. They appear to result from deposition of silt on high banks of sand which subsequently became fixed by vegetation and have later been partially eroded and isolated as islands.

VEGETATION

The banks of the river are lined by River Gums (*Eucalyptus camaldulensis*) in a zone about 60 m wide (Fig. 4). Occasionally they may form broader zones especially where benches incised in the clayey silt are developed by the river. The trees tend to protect and stabilize the banks during floods. Occasionally River Gums grow in the river bed and on the silt-capped islands, but the most common species growing here is the Cadjeput (*Melaleuca leucadendron*). This species forms dense stands immediately upstream from Rocky Pool and around some semi-permanent pools, but elsewhere is more scattered. In general, fewer trees appear to grow in the river bed downstream from Rocky Pool compared with upstream.

During floods, the massive volume of water and debris flowing down the river undermines and uproots many large trees as well as scouring out other vegetation (Fig. 5). In many instances, particularly along the river banks, the River Gums are not killed but their trunks lie parallel to the ground. The trunk then gives rise to numerous adventitious shoots which form a dense coppice-like regrowth. Eventually, these branches give rise to what appear to be several individual trees forming an avenue along the banks (Plate 6). In ensuing flood years many of these branches are forced into contact thus leading to natural grafting within an individual tree (Fig. 7).

As would be expected, the vegetation of the river channel sands is scarce and limited to those opportunistic species which can re-invade after the water dries up, as is shown, for example, by the large number of Asteraceae recorded for the area (see annotated list). Also, as the river dries up, numerous birds and cattle water at Rocky Pool and would be responsible for transporting seeds onto the flat.

On the lateritised Toolonga Calcilutite abutting Rocky Pool, shrubby species such as *Cassia helmsii, Melaleuca glomerata* and *Crotalaria cunninghamii* are more common than in the river bed or on the alluvial flats.

The permanent water of Rocky Pool supports a dense growth of the aquatics *Najas tenuifolia, Myriophyllum verrucosum, Potamogeton javanicus, P. pectinatus* and a species of *Chara*.

An annotated list of species collected from Rocky Pool is included. Voucher specimens for all species are housed at PERTH.

ACKNOWLEDGEMENTS

I thank Bernie Haberley for his excellent assistance in the field. David Johnson gave helpful advice on the geology of the Gascoyne River and Alex George kindly read the manuscript.

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ROCKY POOL ANNOTATED SPECIES LIST

* indicates introduced species.

MONOCOTYLEDONAE

CYPERACEAE

Cyperus vaginatus R.Br.

Erect caespitose sedge to 1 m, inflorescences brown; in alluvial sand fringing permanent water.

LILIACEAE

**Asphodelus fistulosus* L.

Erect herb to 30 cm, flowers white; in alluvial sand.

NAJADACEAE

Najas tenuifolia R.Br.

Submerged aquatic, leaves coarse toothed; common.

POACEAE

**Cenchrus ciliaris* L.

Erect perennial, inflorescences dense, purplish; in alluvial sand.

Eragrostis japonica (Thunb.) Trin.

Erect annual to 50 cm; in alluvial sand.

Eriachne aristidea F. Muell.

Caespitose perennial to 50 cm; in alluvial sand.

POTAMOGETONACEAE

Potamogeton javanicus Hassk.

Aquatic, lower leaves linear, submerged, upper leaves broad, floating, inflorescence emergent.

Potamogeton pectinatus L.

Submerged aquatic, forming dense meadow with *Chara* sp. and *Myriophyllum verrucosum*.

DICOTYLEDONAE

AIZOACEAE

Glinus lotoides Loefl.

Prostrate grey herb, flowers greenish; in river bed in alluvial sand.

AMARANTHACEAE

Alternanthera nodiflora R.Br.

Sprawling herb, flowers white; in alluvial sand.

Ptilotus macrocephalus (R.Br.) Poir.

Erect much-branched herb to 1 m; in alluvial sand.

Ptilotus chamaecladus Diels

Erect much-branched herb to 50 cm, densely flowering, flowers pink; in alluvial sand.

APIACEAE

Daucus glochidiatus (Labill.) Fish., Mey. & Avé-Lall.

Erect herb to 20 cm; in alluvial sand.

ASTERACEAE

Angianthus aff. *strictus* (Steetz) Benth. (KFK 4674)
Herb to 25 cm, flowers white; in alluvial sand.
Angianthus sp. (KFK 4657)
Ephemeral herb to 7 cm, flowers orange; in alluvial sand.
Brachycome ciliaris (Labill.) Less.
Dense herb to 30 cm, flowers violet; in alluvial sand.
Brachycome iberidifolia Benth.
Herb to 10 cm, flowers white to violet; in alluvial sand.
Calotis breviradiata (Ising) Davis
Herb to 30 cm, flowers yellow; in alluvial sand.
**Centaurea melitensis* L.
Erect herb to 40 cm, flowers yellow; in alluvial sand.
Centipeda cunninghammii (DC.) A.Br. & Aschers
Erect herb to 18 cm, flowers white; in alluvial sand.
Flaveria australasica Hook.
Erect herb to 1 m, flowers orange; in alluvial sand.
Gnephosis eriocephala (A. Gray) Benth.
Annual herb to 4 cm, flowers yellow; in alluvial sand.
Helichrysum apiculatum (Labill.) D. Don
Annual herb to 50 cm, flowers yellow; in alluvial sand.
Myriocephalus aff. *nudus* A. Gray (KFK 4658)
Herb to 12 cm, flowers yellow; in alluvial sand.
Pluchea rubelliflora (F. Muell.) Druce
Erect herb to 50 cm, flowers mauve; in alluvial sand.
Pluchea squarrosa Benth.
Erect herb to 50 cm, flowers pink to red; in alluvial sand.
Podolepis microcephala Benth.
Annual herb up to 30 cm, divaricately branched, flowers orange; in alluvial sand.
Pterigeron liatroides (Turcz.) Benth.
Erect, branched herb to 50 cm, flowers pink; in alluvial sand.
Pterocaulon sphacelatum (Labill.) F. Muell.
Erect herb to 50 cm, inflorescences globular, flowers white, tinged pink; in alluvial sand.
Waitzia citrina (Benth.) Steetz
Ephemeral herb to 25 cm, flowers deep yellow; in alluvial sand.

BORAGINACEAE

Heliotropium curassavicum L.
Prostrate, succulent plant, flowers white; in alluvial sand.

CAESALPINIACEAE

Cassia helmsii Symon
Erect, much-branched shrub to 1 m; flowers yellow, scented; in lateritised silt stone.

CAMPANULACEAE

Wahlenbergia sp. (KFK 4678)
Erect herb to 50 cm, flowers blue; in alluvial sand.

CHENOPODIACEAE

Dysphania plantaginella F. Muell.
Erect herb to 10 m, inflorescences cylindrical, green; in alluvial sand.

CONVOLVULACEAE

Convolvulus erubescens Sims

Creeper, leaves linear, flowers white; in lateritised siltstone and alluvial sand.

Ipomoea muelleri Benth.

Trailing ephemeral, flowers pink; in alluvial sand.

GENTIANACEAE

Centaurium spicatum (L.) Fritsch

Erect herb to 30 cm, flowers pink; in alluvial sand.

GOODENIACEAE

Scaevola spinescens R.Br.

Much-branched shrub to 50 cm, flowers white; on indurated lime mudstone.

HALORAGACEAE

Myriophyllum verrucosum Lindl.

Emergent aquatic, leaves whorled, common.

MALVACEAE

Sida sp. (KFK 6332)

Much-branched shrub to 40 cm, flowers yellow; on indurated lime mudstone.

MYRTACEAE

Eucalyptus camaldulensis Dehn.

Trees to 15 m, bark white, smooth, flowers white; in alluvial sand.

Melaleuca glomerata F. Muell.

Erect compact shrub to 50 cm, sterile; on indurated lime mudstone.

Melaleuca leucadendron (L.) L.

Erect tree to 15 m, paper bark, flowers white; in alluvial sand.

PAPAVERACEAE

**Argemone mexicana* L.

Annual herb to 1 m, leaves glaucous, flowers yellow; in alluvial sand.

PAPILIONACEAE

Crotalaria cunninghamii R.Br.

Erect shrub to 1 m, leaves grey/green, flowers green; on indurated lime mudstone.

Indigofera monophylla DC.

Erect shrub 50 cm, flowers red; in alluvial sand.

Mirbelia sp. (KFK 4661)

Dense shrub to 50 cm, flowers orange; on indurated lime mudstone.

Psoralea leucantha F. Muell.

Erect shrub to 1.5 m, leaves grey/green, flowers white in racemes; in alluvial sand.

Sesbania cannabina (Retz.) Poir. var. *cannabina*

Shrub to 60 cm, flowers yellow; in alluvial sand.

Vigna lanceolata Benth.

Creeper, flowers pale yellow; in red clay soil; in alluvial sand.

PORTULACACEAE

Calandrinia sp. (KFK 4675)
Herb, leaves fleshy, flowers pink; in alluvial sand.

PRIMULACEAE

**Anagallis arvensis* L. var. *caerulea* Gouan
Spreading herb, flowers blue; in alluvial sand.

SCROPHULARIACEAE

Morgania floribunda Benth.
Erect herb to 30 cm, flowers violet blue; in alluvial sand.

Stemodia grossa Benth.
Erect viscid herb to 50 cm, flowers deep blue; in alluvial sand.

SOLANACEAE

Datura leichhardtii F. Muell.
Erect shrub to 1 m, flowers white, fruit globular, covered in numerous prickles; in alluvial sand.

Nicotiana occidentalis Wheeler
Herb to 25 cm, basally rosetted, flowers white; in alluvial sand.

**Solanum nigrum* L.
Erect much branched herb, flowers white, mature berries black; in alluvial sand.

STACKHOUSIACEAE

Stackhousia viminea Sm.
Herb to 25 cm, flowers yellow; in alluvial sand.

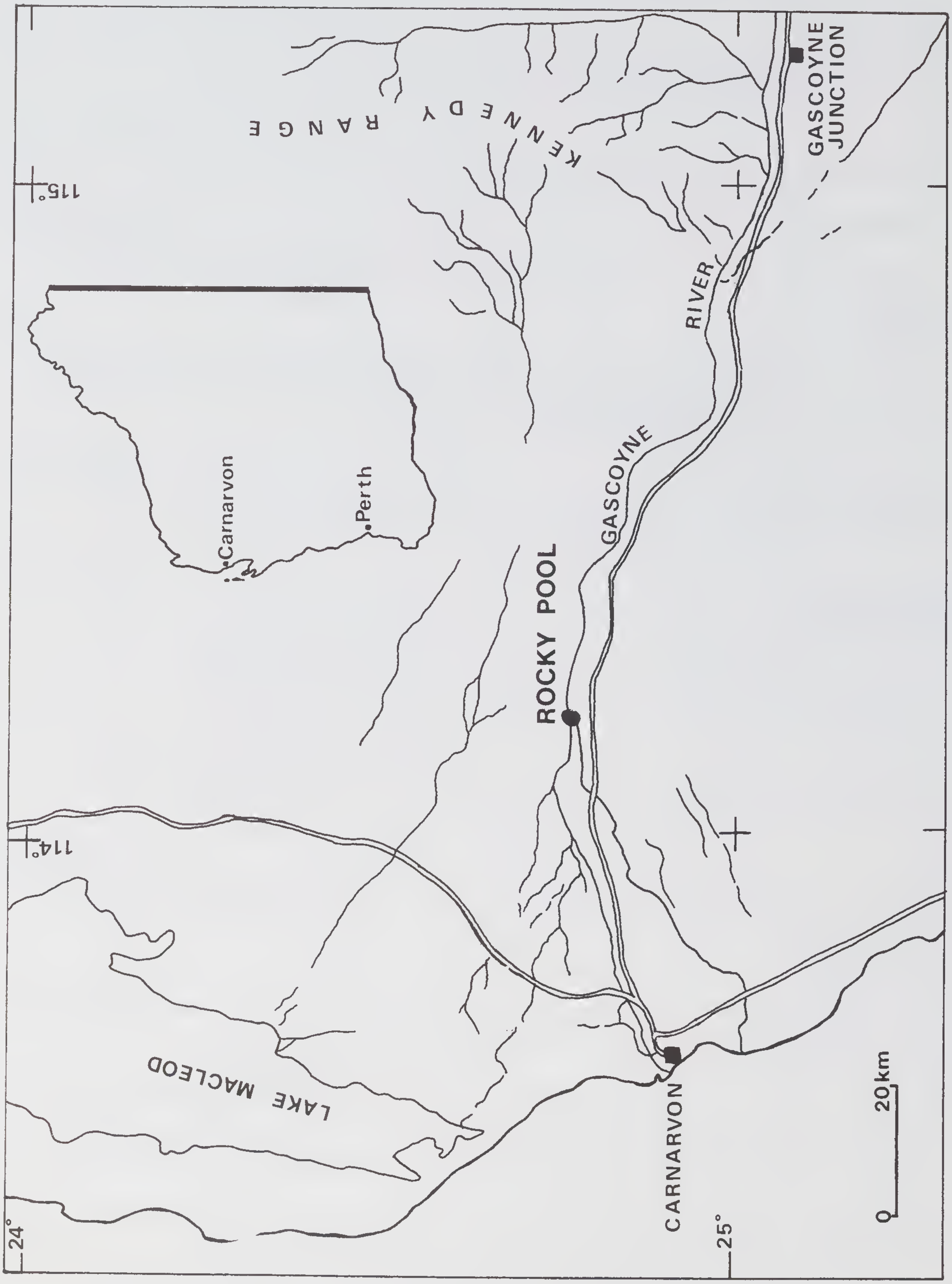

Fig. 1. Locality map showing Gascoyne River and Rocky Pool

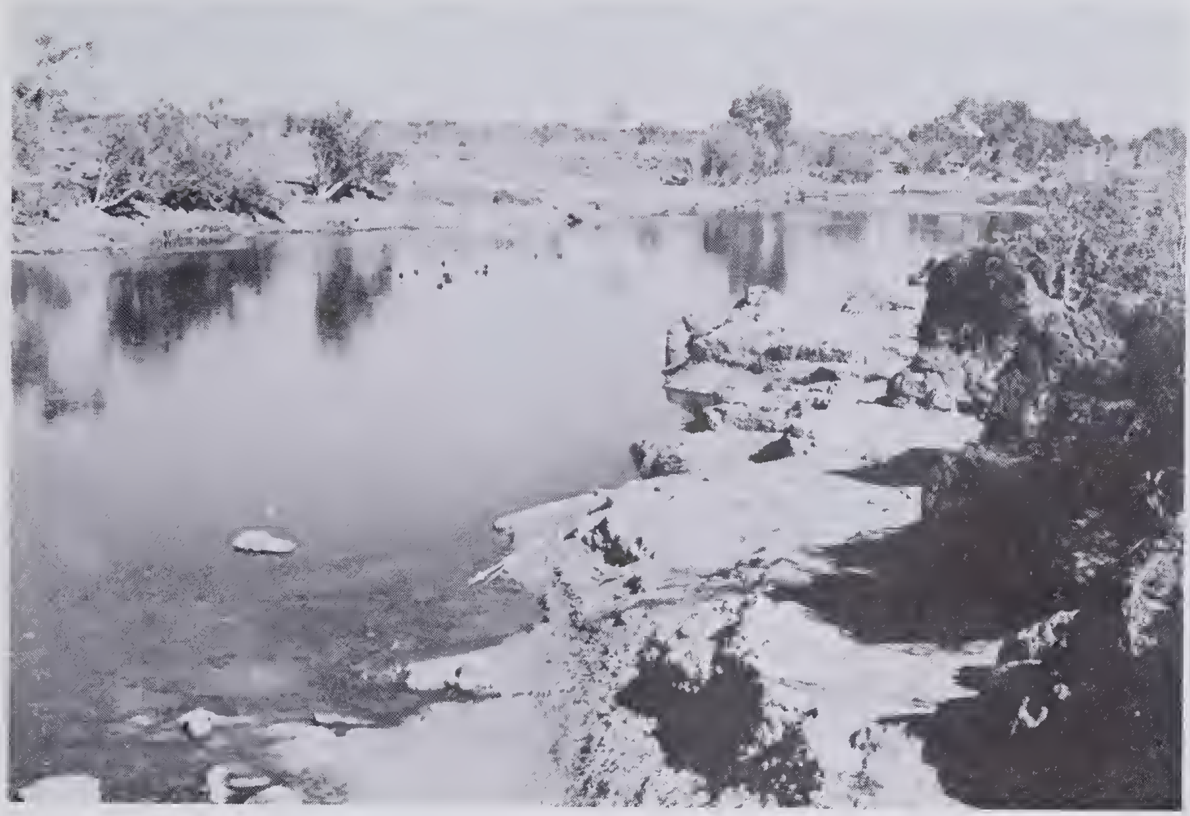

Fig. 2. Rocky Pool from the northern abutment showing the indurated Toolonga Calcilutite.

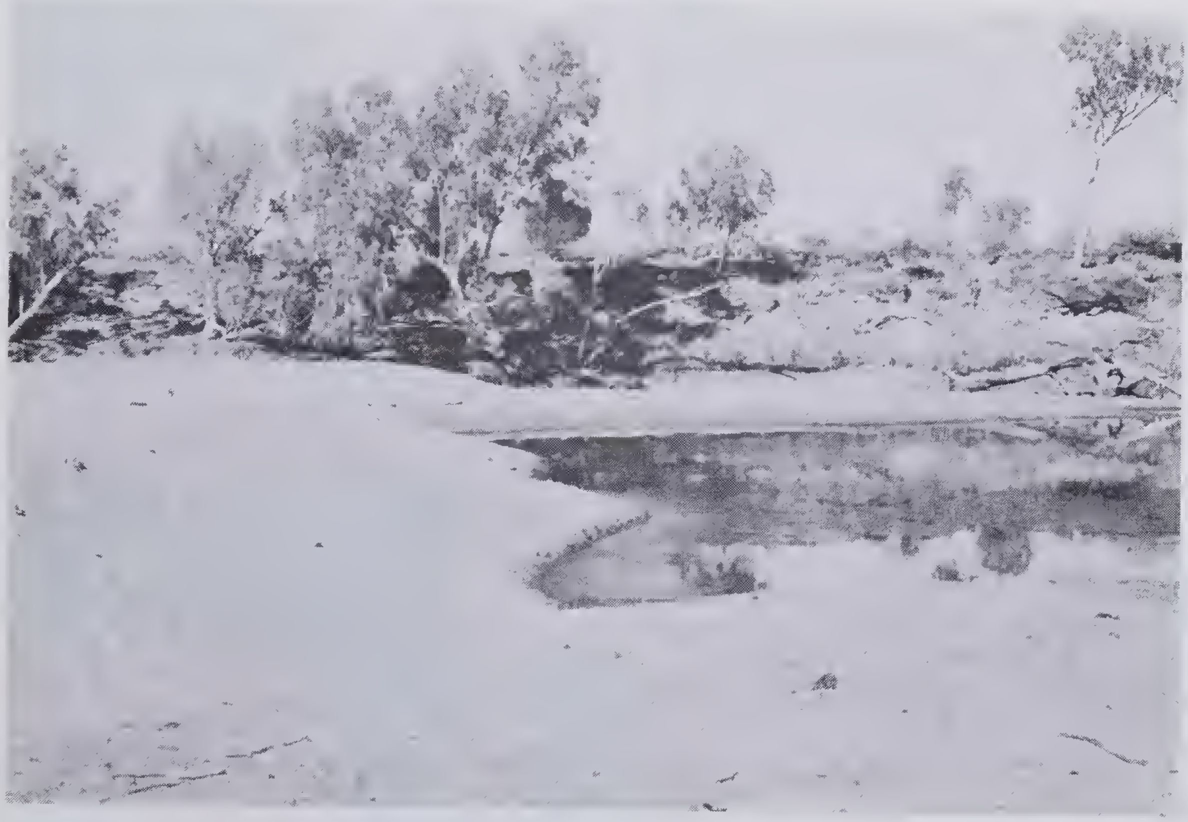

Fig. 3. Eastern end of Rocky Pool showing bank of coarse river sand with Cadjeput (*Melaleuca leucadendron*) and River Gum (*Eucalyptus camaldulensis*) in the background.

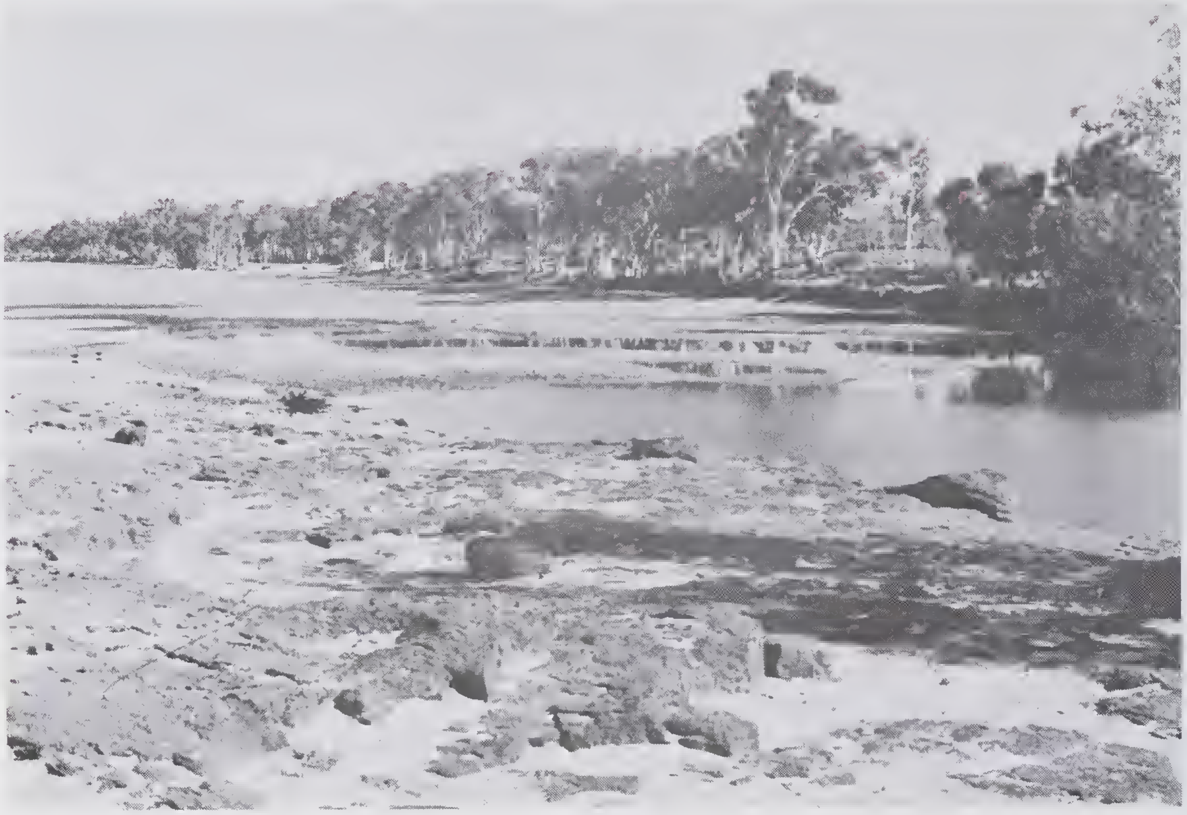

Fig. 4. Western end of Rocky Pool showing indurated Toolonga Calcilutite (foreground) and dense stand of Cadjeput and River Gum on northern bank.

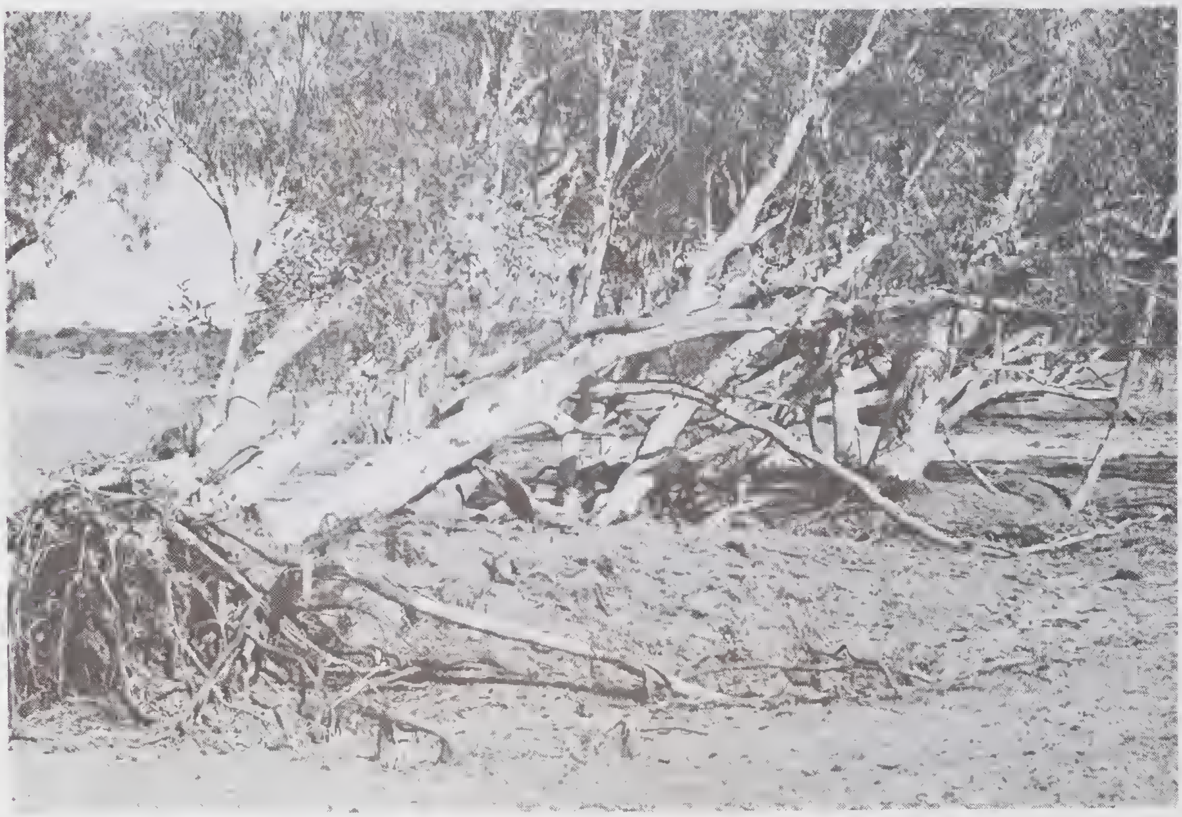

Fig. 5. River Gums (*Eucalyptus camaldulensis*) uprooted and pushed over by flood waters.

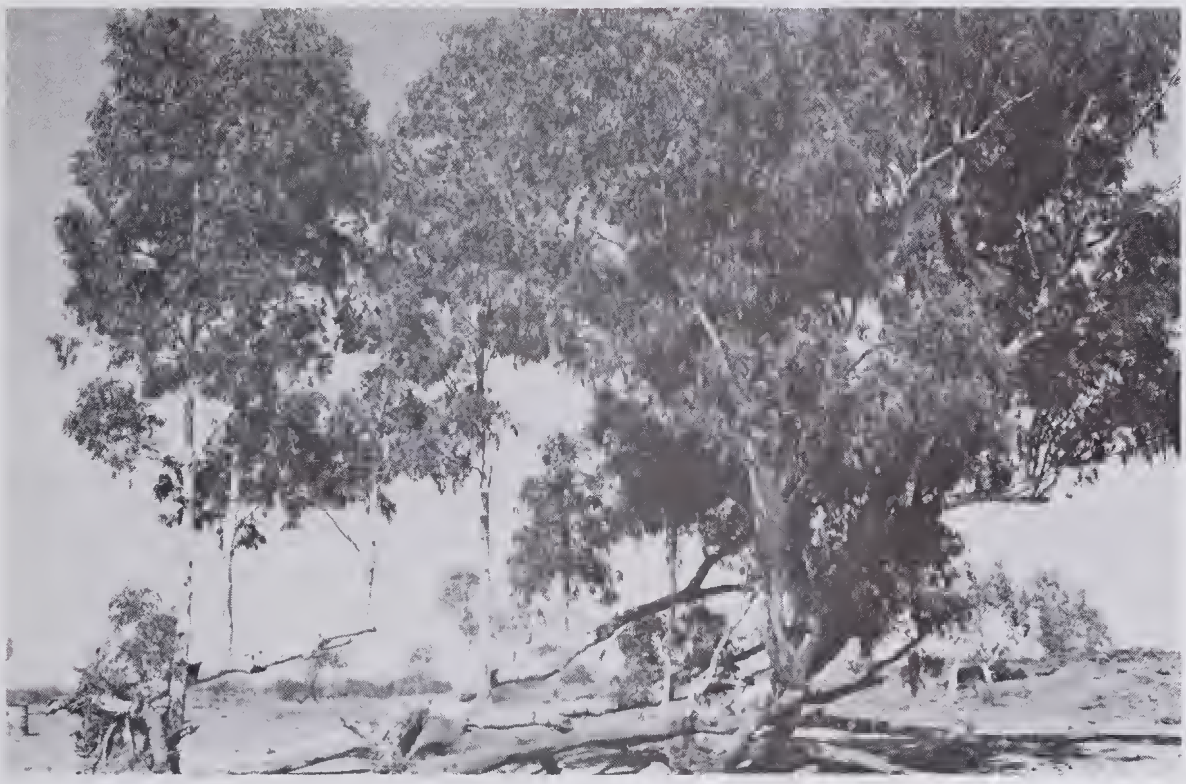

Fig. 6. River Gums with the main trunk lying parallel to the ground producing adventitious shoots.

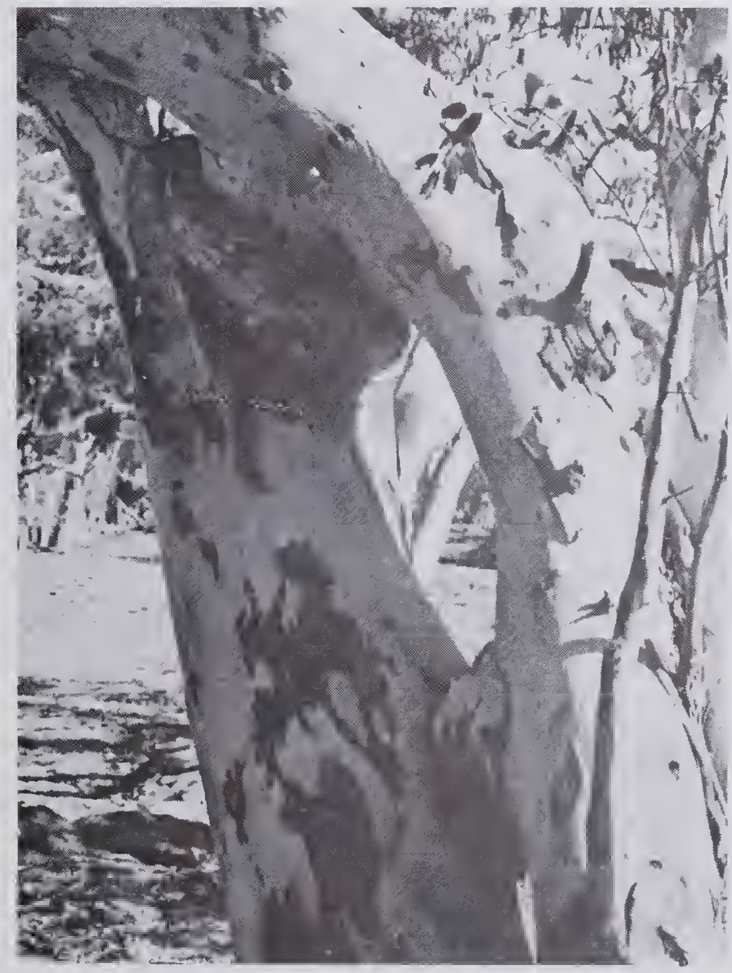

Fig. 7. Natural grafting between River Gum branches forced into contact during flooding. Scale is in cm.

WESTERN AUSTRALIAN HERBARIUM RESEARCH NOTES

No. 1: 41-42

CICENDIA ADANS. (GENTIANACEAE) NATURALIZED IN WESTERN AUSTRALIA

by G.J. KEIGHERY

ABSTRACT

Cicendia filiformis is recorded as a naturalized alien to the flora of Western Australia.

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CICENDIA ADANS. (GENTIANACEAE) NATURALIZED IN WESTERN AUSTRALIA

by G.J. KEIGHERY

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Cicendia filiformis (L.) Delabre and *C. quadrangularis* (Lam.) Griseb. have been recorded as naturalized in South Australia (Black, 1965); New South Wales (Burbidge and Gray, 1970) and Victoria (Willis, 1972). The species are native to Southern and Western Europe (*C. filiformis*) and Northern America (*C. quadrangularis*) and can be separated by a simple key:

Leaves linear-lanceolate, calyx ovoid, ribs not prominent -	*C. filiformis*
Leaves ovate, calyx ovoid with four prominent ribs -	*C. quadrangularis*

All specimens collected in Western Australia agree with *Cicendia filiformis*. Since both species occur in South Australia, it can be anticipated that *C. quadrangularis* will be found in Western Australia in the future. Complete descriptions and illustrations of both taxa can be found in Black (1965) and additional notes in Eichler (1965).

ECOLOGY AND DISTRIBUTION

Known collections are confined to the Swan Coastal Plain and Darling Scarp. However, the small size of the plant may account for its' being overlooked and large range extensions are anticipated.

Within the range reported below, *Cicendia* is found in winter-wet soils (clay swamps or granite moss swards on Red Hill) which have an ephemeral annual cover and few shrubs. The areas where the species is found show signs of disturbance (tracks, fires, or grazing) and the species does not appear to invade undisturbed bushland.

The earliest record for Western Australia appears to be from Yundurup (B.M.J. Hussey) in October, 1972. Other, later collections have been from Bullsbrook, J.R. Martyn Reserve 15 km north of Midland, Red Hill, and University Reserve Orange Grove.

At Orange Grove and Red Hill, plants are autogamous and self fertile; no vectors were noticed visiting the flowers. Seed is small and probably dispersed by wind.

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75950/5/78—1M—L/2788 WILLIAM C. BROWN, Government Printer, Western Australia